

BASELINE SURVEY REPORT

2017

**INTEGRATED HORTICULTURE PROMOTION
PROJECT IN THE WEST CENTRAL REGION**

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Writing & editing: Kenichi Sasaki and Jigme (writing) & Kinley Dorji & Pema Chofil (Editing), with support from IHPP JICA Experts (Yuichi Tomiyasu, Kazuyoshi Yuasa) and other project counterparts (Sonam Chopel, Gyeltshen Tshering, Arjun kumar Ghalley and Tashi Phuntsho)

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Abbreviation and Terminology

ADTC	Agriculture Demonstration & Training Centre (Chimipang Royal Project)
AEO	(Gewog) Agriculture Extension Officer
ARDC	Agriculture Research and Development Sub-Centre
ARDSC	Agriculture Research and Development Centre
AREP	Agriculture Research and Extension Project (JICA)
HRDP	Horticulture Research and Development Project
ARO	Assistant Research Officer
Masl	Meter Above See Level
DAO	Dzongkhag Agriculture Officer
HH	Household
IHPP	Integrated Horticulture Promotion Project in the West Central Region
JICA	Japan International Cooperation Agency
NSC	National Seed Centre
NWFP	Non-Woods Forest Product
RGoB	Royal Government of Bhutan
RO	Research Officer
TCP	Technical Cooperation Project
Dzongkhag	Prefecture/province
Gewog	Block

Crop Classification

Vegetable	Fruit and Nut	Field Crop
Asparagus	Almond	Rice (1 Cropping)
Bitter gourd	Apple	Rice (2 Cropping)
Bottle gourd	Apricot	Wheat
Brinjal	Areca Nut	Maize
Broccoli	Avocado	Buckwheat
Bunching onion	Banana	Cassava
Cabbage	Chestnut	Mustard Oil
Carrot	Grapes	Other
Cauliflower	Guava	
Chili	Hard Shell walnut	
Chili (Doley)	Hazelnut	
Chinese Cabbage	Jack Fruit	
Coriander	Kiwi	Industrial Crop
Cucumber	Lime / Lemon	Garlic
Green Bean	Litchi	Ginger
Japanese green	Mandarin (Orange)	Cardamom
Kidney Bean	Mango	Turmeric
Lady finger	Papaya	Oyster Mushroom
Lettuce	Passion Fruit	Shitake Mushroom
Mung Bean (Green)	Peach	
Mustard green (Saag)	Pear	
Onion (Bulb)	Pecan nut	
Pea	Persimmon	
Pointed gourd	Pine Apple	
Potato	Plum	
Pumpkin	Pomegranate	
Radish	Pumelo	
Red Bean	Soft Shell walnut	
Ridge gourd	Strawberry	
Seewee Beans (Flat)		
Slippers gourd		
Snake gourd		
Soya Bean		
Spinach		
Spine gourd		
Spring onion		
Squash		
Tomato		
Tree Tomato (Tamarillo)		
Turnip		

PREFACE

The Japan International Cooperation Agency (JICA) Technical Cooperation Project (TCP) “Integrated Horticulture Promotion Project in the West Central Region (IHPP)” is being implemented by JICA and Agriculture Research and Development Center, Bajo, Wangduephodrang (ARDC Bajo), Department of Agriculture (DOA), Ministry of Agriculture and Forest (MoAF). Project cover five Dzongkhags (Punakha, Wangdue Phodrang, Tsirang, Dagana and Gasa) and the project was launched on 13th January 2016.

This document provides the findings of Baseline Survey carried out by IHPP in collaboration with concerned Dzongkhag Agriculture Sector in the month of May and June 2016. The main purpose of the baseline survey was to obtain necessary information for effective implementation of project activities and to establish a reliable baseline data of the project sites to serve as a main basis for project implementation, and evaluation of the project performance/outcome.

EXECUTIVE SUMMARY

1 Description of the project

Agriculture is the prime industry and social backbone of the Kingdom of Bhutan. Agriculture sector contributes to 16% of the country's GDP and employs 56% of the total employed persons in 2013. In addition, horticulture is major income source of the farmer/household. Despite of this significance of horticulture promotion, commercial farming has not developed prosperously due to lack of research and development (R&D) and effective extension systems.

Upon the request of Royal Government of Bhutan (RGoB), JICA had supported horticulture promotion from 2000 to address these issues in eastern region by individual technical expert (2000~2004), technical cooperation project of "Agriculture Research and Extension Project (AREP: 2005~2009) and Horticulture Research and Development Project (HRDP: 2010~2015). Following the significant achievement and success in eastern region, to disseminate the success, the "Integrated Horticulture Promotion Project in the West Central Region (IHPP)" was commenced on January 2016. The project aims at promoting horticulture through improving and strengthening research, development and extension system, and ultimately increase the production of horticulture in West-Central region of Bhutan.

The projects goals, purpose and outputs are here under;

- Overall Goal** : Horticulture production is expanded with appropriate technologies in the target areas
- Project Purpose** : Implementation system for promotion of horticulture production in the target areas is developed
- Project Outputs** :
 - Output 1:** Appropriate technologies for promoting horticulture farming are developed
 - Output 2:** Vegetable seeds and fruits seedlings production system at ARDC-Bajo, private nurseries and seed growers is strengthened
 - Output 3:** Training and extension system (outreach programs) for promoting horticulture farming is strengthened

The key components of the project are technology development and dissemination such as identifying and promoting suitable horticulture crops, seeds and seedlings production, capacity development of research and extension officials, outreach programs along with systematic training of farmers and developing training /extension material.

The Project Design Matrix (PDM) with verifiable indicators means of verification and important assumptions are as given in the Annexure 1.

2 Purpose of the Study

The primary purpose of this study was (1) to obtain necessary information for efficient and effective implementation of the IHPP, (2) to come up with verifiable indicators and other required information for the project monitoring and evaluation, (3) to establish a reliable baseline data for the project sites. The information collected and established in this study will be used in the course of project implementation, impact assessment and evaluations.

3 Methodology

3.1 Survey Area and Respondents

The Baseline survey covered two main groups of respondents which include target beneficiaries (farmers of four Dzongkhag except Gasa which was included by Project JCC on Nov. 2017 after this baseline survey of the farmers was conducted) and project counterparts or other stakeholders in Dzongkhags and related agriculture centers. The report Farmers formed the first group as the target beneficiaries while Horticulture at ARDC Bajo and ARDSC Mithun (project counterparts), Dzongkhag Agriculture Officers (DAOs), Agriculture Extension Officers (AEOs), and other concerned officials such as Chimipang Royal Project (Agriculture Demonstration & Training Center; ADTC) Chimipang and National Seed Center (NSC) Bajo were categorized under the second group

(1) Household level/Farmers (target beneficiaries);

- Selected 4~10 small and medium scale farmers in different altitude (400~1000m, 1001~1600m, 1601~2200m) by Gewog Agriculture Extension in horticulture potential 6~8 Gewog in each Dzongkhag.

(2) Researcher, Dzongkhag Agriculture Sector, Others (Other Stakeholders)

- IHPP counterpart (ARDC Bajo, ARDSC Mithun)
- Dzongkhag Agriculture Officer (DAO) / Gewog Agriculture Extension (AE) in four Dzongkhag
- Official of related organization (ARDCs, Royal Project (ADTC) Chimipang, NSC, other)

3.2 Survey Method

Since majority of farmers were illiterate, the survey was carried out through enumerated interview. The questionnaire was fill-in by IHPP and AE team. For Researcher, Dzongkhag Agriculture Sector group, the questionnaires and responses were distributed and collected via E-mail. The “Units Conversion Tables; RNR Census 2009, MoFA” was used for conversion of different units with regards to land area and crop produce. The photos of some vegetables, fruits and nuts were used to aid identification of crops during the interview.

A structured questionnaire for the farmers (Annexure 2), Researchers and Dzongkhag Agriculture Sector group (Annexure 3) was developed to get the required information from the respondents.

4 Sample Size

4.1 Farmers

The Farmers survey was carried out in 27 Gewogs of four Dzongkhags with a total of 184 sample HHs. Approximately 7 respondents from each of the Gewogs were interviewed. Further, the sampling was stratified based on altitude (Low: <1000m, Mid: 1001~1600m, High: >1600m) within the Gewogs to cover all the agro-ecological zones. The Gewogs that are agro-ecologically suitable for horticulture production and the area with greater scope for implementation of the project activities were selected in consultation with Dzongkhag Agriculture Sectors.

4.2 Researcher, Dzongkhag Agriculture Sector, Others (Other Stakeholders)

The questionnaire was distributed to 78 target respondents (17 from ARDC/Royal Project (ADTC)/NSC, 61 from DAO/EA) via E-mail, and 10 Researchers of ARDC Bajo, 2 Researchers of ADTC, 3 Officials of NSC and 43 of DAO/AEO has been responded.

5 Data Analysis

The survey data was separately analyzed at three category levels (Household level, Extension level, and Research) using Microsoft Excel 2013 and the results are presented using descriptive statistics (graphs, charts and tables).

**INTEGRATED HORTICULTURE PROMOTION PROJECT IN THE
WEST CENTRAL REGION
(IHPP-JICA/ARDC Bajo)**

**SECTION (A)
BASELINE SURVEY REPORT
Findings at Farmers' Level**

FINDINGS AT FARMERS LEVEL

1.1 Study Areas and Sample Size

In 27 Gewogs of four Dzongkhags with a total of 184 sample HHs. Approximately 7 respondents from each of the Gewogs were interviewed.

Table 1-1 : Sample Gewogs and No. of Respondent

Dzongkhag	Gewogs	Altitude wise Sample			Total
		Low (<1000m)	Mid (1001-1600m)	High (>1600m)	
Punakha	Shengana	0	0	5	5
	Kabjisa	0	7	1	8
	Barp	0	3	3	6
	Guma	0	6	2	8
	Toepisa	0	0	8	8
	Talo	0	4	3	7
Wangdue Phodrang	Athang	5	1	0	6
	Bjenag	0	6	1	7
	Darkar	2	2	2	6
	Gase Tshongongm	0	2	4	6
	Kazhi	0	0	6	6
	Nahi	0	1	3	4
	Phangyuel	0	1	5	6
	Ruebisa	0	4	4	8
Tsirang	Kilkhorthang	2	6	0	8
	Gosarling	2	4	0	6
	Sergithang	7	1	0	8
	Pungtenchhu	1	6	0	7
	Doonglagang	0	6	0	6
	Mendelgang	4	4	0	8
Dagana	Dorona	4	2	0	6
	Gozhi	5	1	2	8
	Karna	7	2	1	10
	Khebisa	1	4	0	5
	Tashiding	5	2	0	7
	Tsangkhā	0	6	0	6
	Tsenda-Gang	2	4	2	8
Total		47	85	52	184

1.2 Key Baseline Indicators

The key baseline indicators derived from the baseline survey of the Farmers/Household (HH) were as follows;

- Education Level: 56% of Respondent, 74% of HH head were uneducated.
- Land holding: HH average was 5.07 acre (Wet land 2.39 acre and Dry land 2.67 acre)
- Fallow land: Average 0.93 acre per HH (18% of the average HH land holding)

- Annual Income: Average Nu. 173,194 per HH
- Agriculture Annual Income: Average Nu. 111,150 per HH (64% of the HH income)
- Agricultural Income composition: Vegetable 33%, Livestock 22%, Industrial Crop 19%, Fruit/Nut 17% (69% are from horticulture crop)
- Farmers Marketing Agriculture Products : Field Crop 19%, Vegetable 47%, Industrial Crop 16%, Fruit/Nut 11% Distance to nearest Town/Weekend Market: Average 15.8km
- Top 5 Income generating Vegetable: Chili, Green Been, Potato, Broccoli, Cauliflower
- Top 5 Income generating Fruit/Nut: Mandarin, Banana, Pear, Peach, Passion Fruit
- Top 5 Suitable Vegetable: Mustard green, Chili, Cabbage, Broccoli, Green Been
(Reason; Easy Cultivation 29%, High Demand/Price 23%, High Yield 22%)
- Top 5 Suitable Fruit/Nut: Mandarin, Peach, Pear, Mango, Avocado
(Reason; Easy Cultivation 29%, High Demand/Price 27%, High Yield 23%)
- Interest on New Vegetable Crop: Yes 30%, Yes but no idea was 62%
- Interest on New Fruit/Nut Crop: Yes 45%, Yes but no idea was 50%
- Chemical Use: Weedicide 54%, Pesticide 33%, Rodenticide 8%, Fungicide 7%
- Chemical fertilizer Use: 49%
- Top 3 Problems in Crop Cultivation: Water deficiency, Pest/Disease, Wild Animal depredation
- Farmers Group Engagement: 45% of famers were Engaged
- Agriculture Training Attended: 45 % of famers attended of which 81% was Organized by DAO and 8% by ARDC
- Training Needs on Vegetable cultivation: Nursery Management 74%, Pest & Disease Control 65%, Planting / Transplanting 50%, Water Management 34%
- Training Needs on Fruit/Nut cultivation: Pruning/Training 78%, Grafting/Top-working 70%, Planting / Transplanting / Layout 53%, Nursery Management 38%

1.3 General Information of Household

The general information of the household includes Age, Gender, Education Level of Respondent and HH Head, HH-member composition, Accessibility to the Road/Nearest Market, and Mobility.

1.3.1 Age and Gender

Respondent's average age was 48 years. Elderly dependency ratio was highest in Wangdue and lowest in Dagana. 70% of respondent and 66% of HH were male. HH head gender were balanced in Punakha and Wangdue while Tsirang and Dagana had more than 80% HH headed by male.

Table 1-2 : Respondent and Household; Age and Gender

Dzongkhag (HH No.)	Gender				Age						
	Male		Female		<40		41~60		>60		Ave.
(1) Respondent											
Punakha (42)	29	69%	13	31%	17	40%	14	33%	11	26%	48
Wangdue (49)	30	61%	19	39%	10	20%	18	37%	21	43%	53
Tsirang (43)	29	67%	14	33%	13	30%	23	53%	7	16%	46
Dagana (50)	41	82%	9	18%	19	38%	25	50%	6	12%	44
(2) Household Head											
Punakha (42)	19	45%	23	55%	6	14%	18	43%	18	43%	57
Wangdue (49)	24	49%	25	51%	3	6%	24	49%	22	45%	56
Tsirang (43)	37	86%	6	14%	6	14%	24	56%	13	30%	55
Dagana (50)	41	82%	9	18%	6	12%	28	56%	16	32%	55

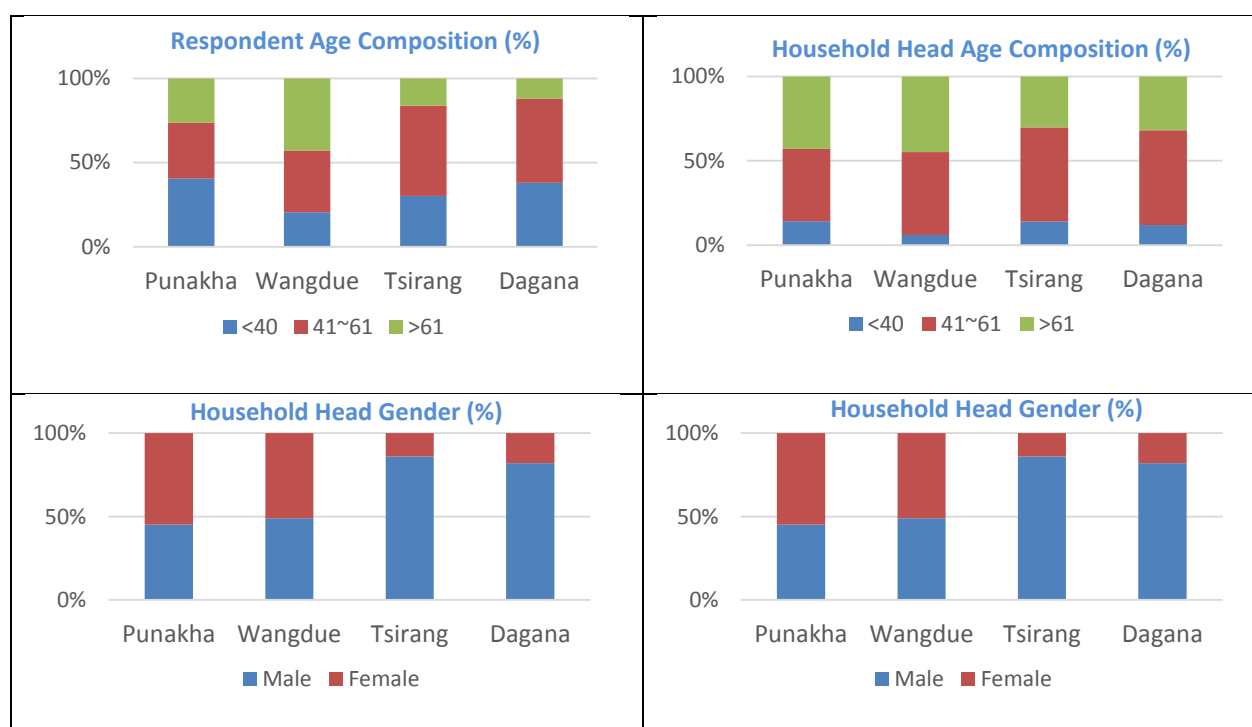


Figure 1-1 : Gender, household head's age, and age compositions

Average family member per HH was seven (7), with a maximum of 23 and minimum one (1). About 53% of the respondents were within the age group of 20 ~ 60 while 36% were below 20 years and 11% were above 61 years.

Table 1-3: Household Family Members; Gender and Age Composition

Dzongkhag (HH No.)	Age and Gender (No.)												Ave. Family Member		
	0~5		6~13		14~20		21~40		41~60		>61				
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
Punakha (42)	0.5	0.4	0.6	0.5	0.5	0.7	1.1	1.4	0.7	0.7	0.5	0.4	3.8	4.1	7.7
Wangdue (49)	0.3	0.4	0.5	0.5	0.5	0.5	1.3	1.3	0.6	0.8	0.5	0.6	3.8	4.0	7.8
Tsirang (43)	0.2	0.2	0.4	0.5	0.3	0.5	0.7	0.8	0.6	0.6	0.3	0.2	2.6	2.8	5.4
Dagana (50)	0.3	0.2	0.4	0.4	0.5	0.6	1.0	1.5	0.9	0.7	0.4	0.3	3.5	3.7	7.2

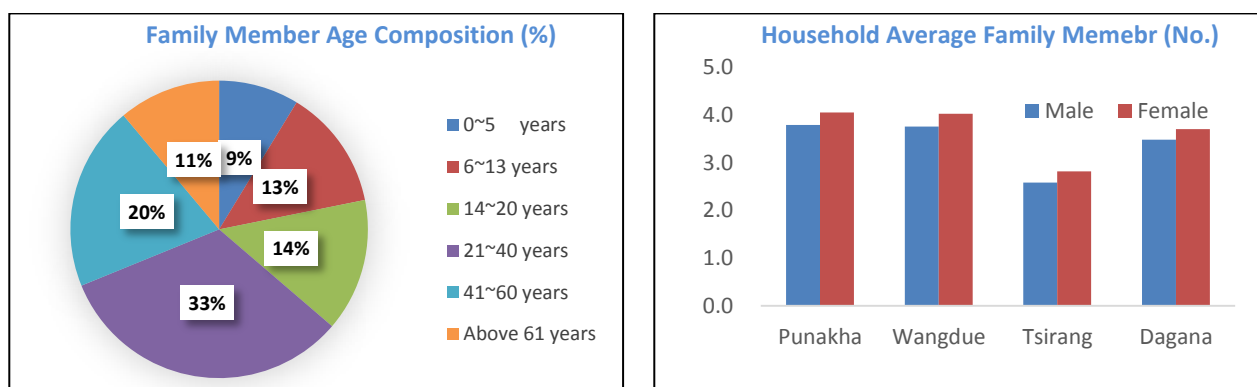


Figure 1-2: Household average family member and family age composition

1.3.2 Education Level

56% of Respondent and 74% of HH Head were uneducated. Education level in Tsirang was slightly higher than other three Dzongkhags.

Table 1-4: Respondent and Household Education Level

Dzongkhag (HH No.)	Non		C1-6		C1-8		C1-10		C1-12		Degree /more	
(1) Respondent												
Punakha (42)	24	57%	7	17%	4	10%	2	5%	2	5%	3	7%
Wangdue (49)	30	61%	11	22%	3	6%	2	4%	3	6%	0	0%
Tsirang (43)	21	49%	13	30%	2	5%	3	7%	1	2%	3	7%
Dagana (50)	28	56%	13	26%	1	2%	6	12%	1	2%	1	2%
(2) Household Head												
Punakha (42)	37	88%	3	7%	0	0%	1	2%	0	0%	1	2%
Wangdue (49)	39	80%	5	10%	2	4%	2	4%	1	2%	0	0%
Tsirang (43)	23	53%	14	33%	2	5%	2	5%	0	0%	2	5%
Dagana (50)	38	76%	10	20%	1	2%	1	2%	0	0%	0	0%

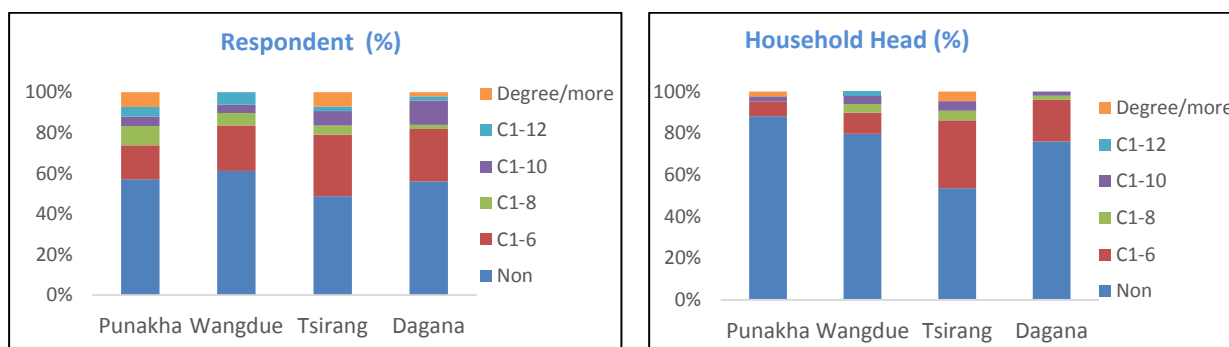


Figure 1-3: Respondent and Household head education level

1.3.3 Road Accessibility and Mobility

1.3.3.1 Road/Market Accessibility

Most of the HHs were located close to road (with in 0.45 km from road end) and mostly connected with farm road. Distance to nearest market was 15.8 Km, and the main markets ware, Kuruthang in Punakha, Bajo and/or Kuruthang in Wangdue, Damphu and/or Gelephu in Tsirang and Dagana.

Table 1-5: Road Accessibility of Gewog/Dzongkhag

Dzongkhag	Gewogs	Walking distance from Road end (Ave. Km)				Distance from nearest Town/ Weekend Market (Ave. Km)			
		Farm road	Feeder road	Highway	Ave.	Farm road	Feeder road	Highway	Ave.
Punakha	Shengana	3.0			3.0	3.0	3.0		6.0
	Kabjisa	0.0			0.0	15.0		13.9	28.9
	Barp	0.0			0.0	4.0		4.0	8.0
	Guma	0.9			0.9			7.0	7.0
	Toepisa	0.3			0.3			20.0	20.0
	Talo	0.0			0.0	12.7		10.8	23.4
Wangdue Phodrang	Athang	0.8			0.8	26.4			26.4
	Bjenag	0.0			0.0	19.3		16.5	19.7
	Darkar	0.0			0.0	40.0			40.0
	Gase Tshongongm	0.0			0.0	8.6			8.6
	Kazhi	0.2			0.2	20.0			20.0
	Nahi	0.0			0.0	16.8			16.8
	Phangyuel	0.0			0.0	16.2	10.0		15.2
	Ruebisa	0.0			0.0	13.3			13.3
Tsirang	Kilkhorthang	0.4							0.4
	Gosarling	0.1				0.0			0.1
	Sergithang	1.0							1.0
	Pungtenchhu	0.3							0.3
	Doonglagang	0.3							0.3
	Mendelgang	0.0	0.4			0.0			0.9
Dagana	Dorona	2.0		0.0	2.0	16.8		29.5	21.0
	Gozhi	0.2		0.5	0.2			7.7	8.5
	Kama	0.0		0.2	0.2	12.5		14.5	14.1
	Khebisa	1.5			1.5	6.0			6.0
	Tashiding	0.0		1.0	0.4	9.5		14.1	11.1
	Tsangkha	0.5		0.0	0.3	5.0		7.3	5.8
	Tsenda-Gang	0.0		0.0	0.0	7.0	5.0	4.3	4.5

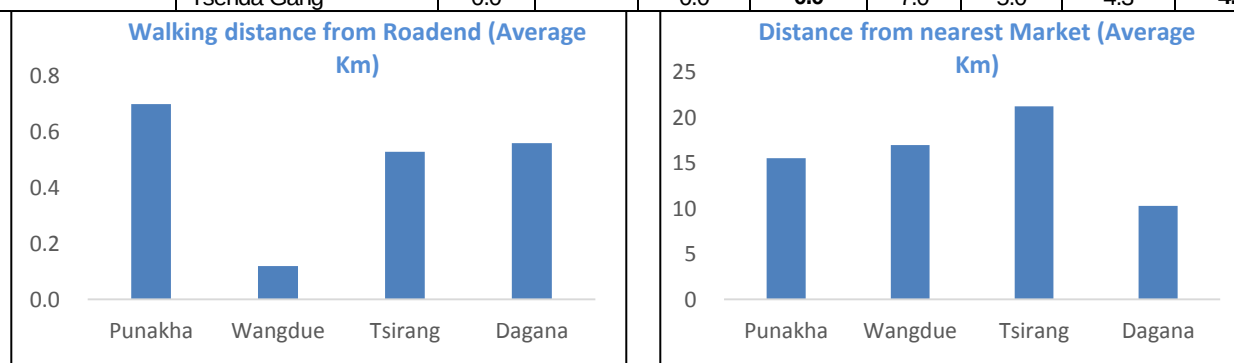


Figure 1-4: Distance from road and nearest market

1.3.3.2 Vehicle Holding

Out of 184 farmers, 58 (32%) of HH owned truck or car, and three farmers (3) had Motorbike. Dzongkhag wise study showed that more than half of HHs in Punakha had mobility while other Dzongkhags were less than 30%.

Table 1-6: Vehicle holding of Respondent in Dzongkhag

Dzongkhag	Truck		Car		Motorbike		Bicycle	
Punakha (42)	4	10%	16	38%	2	5%	0	0%
Wangdue (49)	0	0%	13	27%	0	0%	0	0%
Tsirang (43)	6	14%	7	16%	0	0%	0	0%
Dagana (50)	1	2%	11	22%	1	2%	0	0%
Total	11	6%	47	26%	3	2%	0	0%

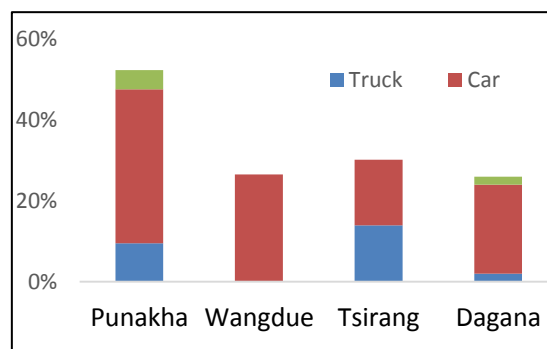


Figure 1-5: Types of vehicles by Dzongkhags

1.4 Household Income

1.4.1 Gross Income

Average annual income per HH was Nu. 172,705, with maximum of Nu. 1,274,500 and minimum of Nu. 0 (2 household, 1 each in Tsirang and Dagana). Punakha had highest average income of Nu. 213,707 followed by Tsirang (Nu. 162,317), Dagana (Nu. 180,583), lowest was Wangdue (Nu. 138,638). Average income and income composition also differed between Gewogs and Altitude (MASL). Tsenda-Gang Gewog in Dagana had the highest average income of Nu. 301,400 while Athang Gewog in Wangdue had lowest (Nu. 68,583).

Table 1-7: Household Average Annual Income (in Nu. 1,000)

Dzongkhag	Gewogs	Agriculture	Gov. Service	Private Business	Labour	Pension	Remittance	Others	Total
Punakha	Shengana	143	0	40	0	0	29	0	213
	Kabjisa	191	6	37	1	0	8	13	255
	Barp	84	0	0	12	0	18	42	155
	Guma	195	21	9	0	0	14	0	239
	Toepisa	63	0	30	4	0	16	1	115
	Talo	224	17	0	3	0	52	4	300
Wangdue Phodrang	Athang	33	14	17	1	0	5	0	69
	Bjenag	50	33	34	0	5	6	0	128
	Darkar	43	14	33	10	2	23	3	127
	Gase Tshongongm	31	68	0	0	0	25	0	124
	Kazhi	34	38	5	0	0	12	0	88
	Nahi	52	0	9	0	4	104	4	172
	Phangyuel	111	30	51	0	0	6	0	198
Tsirang	Ruebisa	179	0	0	11	0	18	0	208
	Kilkhorthang	145	0	3	5	0	1	0	213
	Gosarling	289	0	0	0	0	3	0	255
	Sergithang	66	0	13	25	0	4	15	155
	Pungtenchhu	16	0	31	6	0	0	0	239
	Doonglagang	99	0	89	3	0	0	0	115
	Mendelgang	150	24	0	6	0	9	0	300
Dagana	Dorona	41	27	43	2	10	8	0	130
	Gozhi	66	60	15	18	8	0	0	166
	Kama	74	61	33	3	0	7	0	178
	Khebisa	37	0	0	20	0	19	0	76
	Tashiding	96	0	93	4	9	11	0	214
	Tsangkhha	91	31	0	17	0	3	0	142
	Tsenda-Gang	243	19	18	13	0	9	0	301

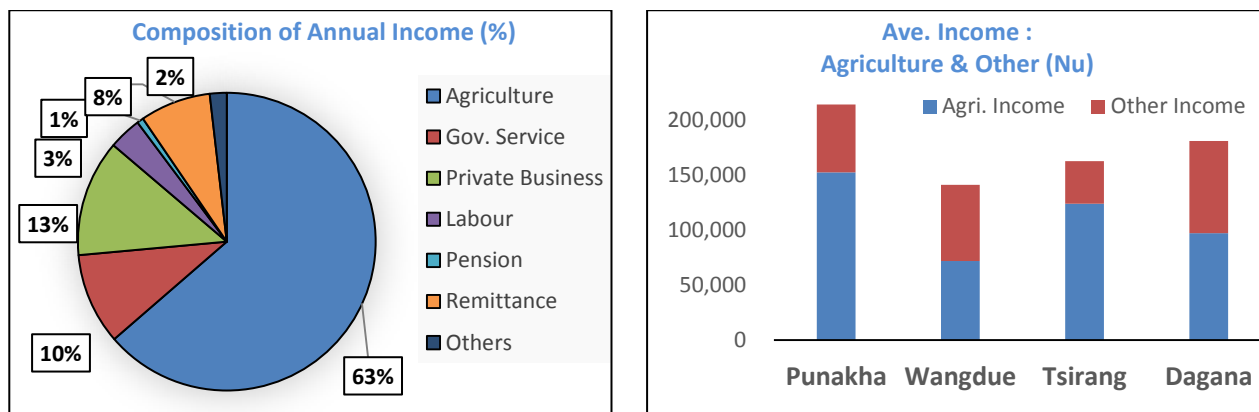


Figure 1-6: Income sources and agricultural income

Agricultural income share in total income was 64% on average, Tsirang had maximum share of 76% followed by Punakha (71%), Dagana (54%) and Wangdue (51%). Ruebisa Gewog in Wangdue had highest average Agriculture income of Nu. 179,348 while Phungtenchhu in Tsirang had lowest of Nu. 15,995.

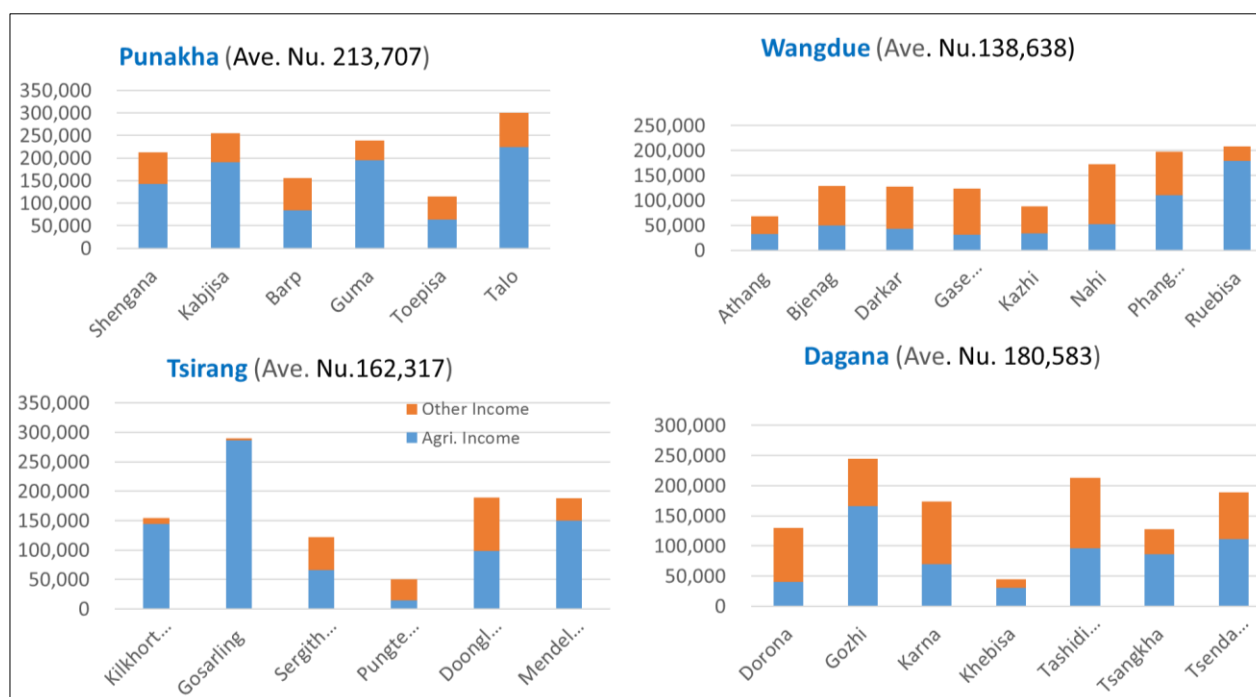


Figure 1-7: Average income and agriculture income in different Dzongkhag

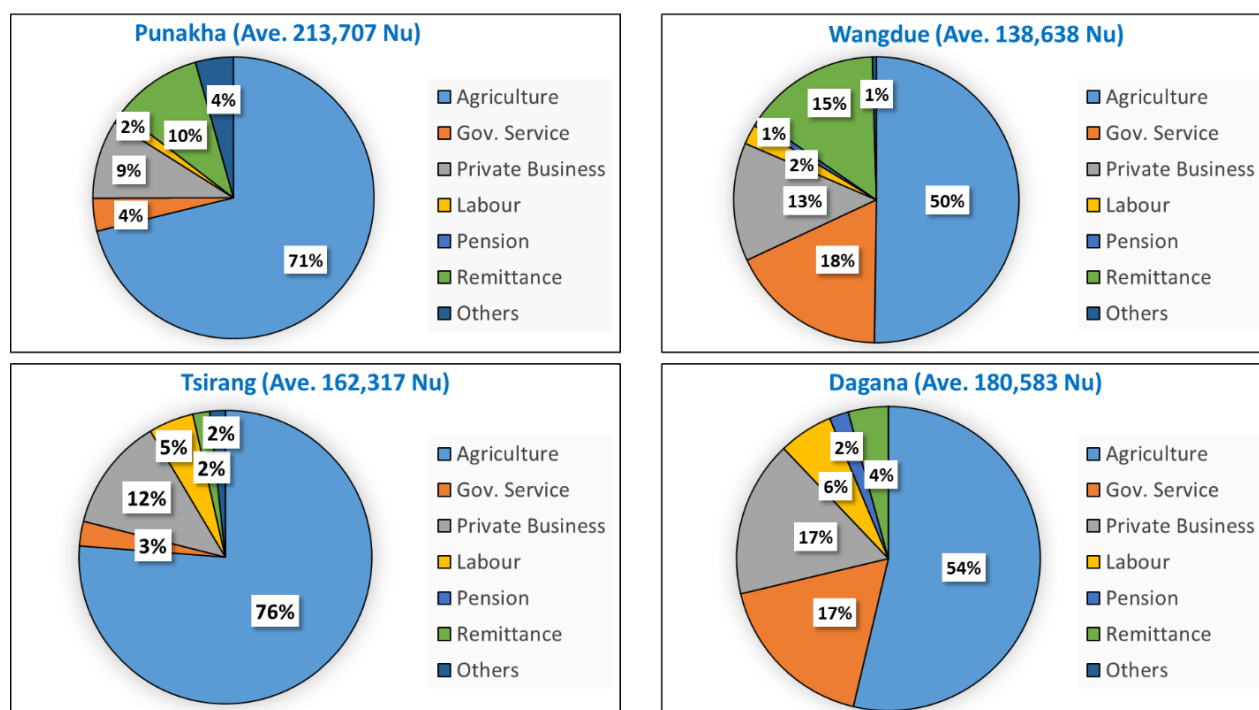


Figure 1-8: Annual Income composition in Dzongkhag (%)

Average income in MASL wise; in the HH located in below 1000m had average income of Nu. 133,064 that 50% was from agriculture, between 1001~1600m had average income of Nu 185,289 and 72% was from agricultural, average income of above1601m was Nu. 190,699 and 58% was from agriculture.

Table 1-8 Household Average Income in MASL (in Nu. 1,000)

MASL	No. of Farmer	Agriculture	Gov. Service	Private Business	Labour	Pension	Remittance	Others	Total
<1000m	48	66	17	27	10	4	6	3	133
Wangdue	7	25	12	43	3	0	12	2	98
Tsirang	17	97	11	19	14	0	2	7	150
Dagana	24	56	23	29	9	8	7	0	132
1001~1600m	84	133	11	23	7	0	9	2	185
Punakha	20	205	11	18	5	0	18	7	264
Wangdue	17	106	29	18	7	2	9	1	172
Tsirang	26	141	0	21	4	0	4	0	170
Dagana	21	77	9	35	12	0	8	0	140
>1601m	52	110	31	16	2	0	27	5	191
Punakha	22	104	5	20	1	0	26	12	168
Wangdue	25	61	25	12	0	1	31	0	131
Dagana	5	377	168	18	11	0	12	0	586

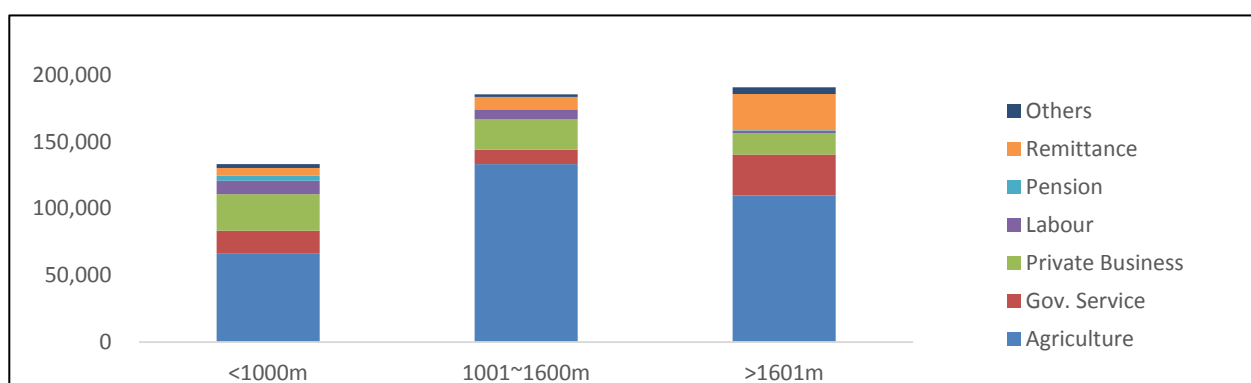


Figure 1-9 Average annual income composition by MASL (Nu.)

1.4.2 Agricultural Income

Gross average Agricultural income per HH was Nu. 110,214. The highest was Nu. 1,269,000 in Tshendagang, Dagana. Out of Agricultural farming, Horticulture Crop share to agricultural income was 69% (Vegetables 33%, Fruits/Nuts 17%, Industrial Crops 19%) followed by Live Stock 22% (mainly Dairy farming). Field crops representation to agricultural income was less as it is mostly consumed in HH itself and/or shared without actually selling them for cash income.

Table 1-9: Household Average Agricultural Income by Category (Nu.)

	Field Crop	Vegetable	Industrial Crop	Fruits & Nuts	Forest	Live Stock	Total
Punakha	34,470	74,924	948	18,558	618	25,101	154,620
Wangdue	5,698	44,975	306	4,661	1,166	15,578	72,383
Tsirang	1,402	19,399	28,522	35,066	159	39,256	123,804
Dagana	1,035	7,062	51,293	19,668	100	17,599	96,756
Gross Ave.	9,995	35,965	20,902	19,003	516	23,834	110,214

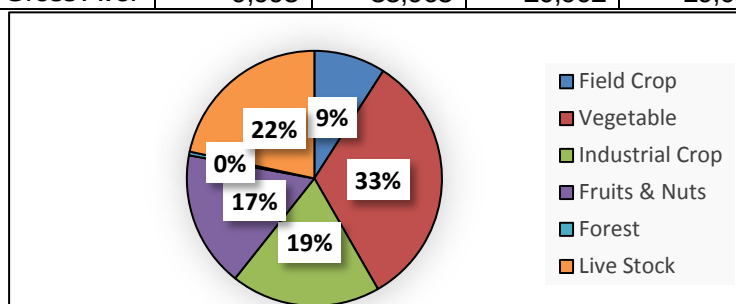


Figure 1-10: Income from different agricultural commodities

Agricultural income share varied among Dzongkhags and commodities considered. In Punakha, vegetable earned 49% of the agricultural income while field crop earned only 22%. Vegetable share constituted 62% in Wangdue while field crop and livestock contributed to 8% and 22% respectively. In Tsirang, livestock constituted 32% followed by fruits/nuts 28% industrial crop 23%. In Dagana, Industrial crop contribution to agricultural income was 53%, and fruit/nut was 21%.

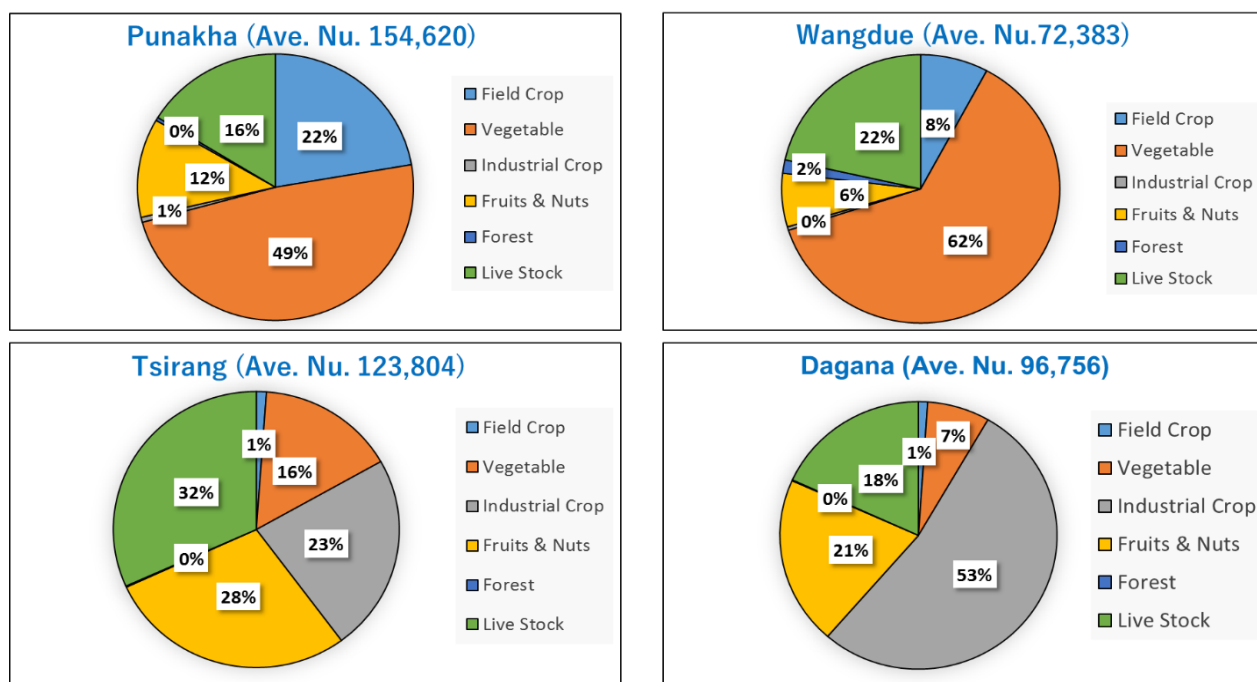


Figure 1-11: Income from agricultural commodities for different Dzongkhags

1.5 Agricultural Land holding and Utilization

Average Land holding per HH was 5.08 acre. 48% of HHs had less than 4 acre while 24 % had 4~5.9 acre and 28% had more than 6 acre. Largest acreage was 24 while smallest area was 0.73 acre.

Table 1-10: Household Land Holding Range (Acre)

	<1.9	2~3.9	4~5.9	6~9.9	10~19.9	>20
Punakha	7	19	9	6	1	0
Wangdue	8	19	7	9	5	1
Tsirang	8	11	15	8	1	0
Dagana	4	11	14	11	8	2
Total	27	60	45	34	15	3

On average, Dagana had largest HH landholding (6.47 acre), followed by Wangdue (5.26 acre), Tsirang (4.2 acre and Punakha (4.09 acre). Under land categories, Wet land constituted 47% and Dry land was 53%. Punakha and Wangdue had more Wet land while Tsirang and Dagana had more area under Dry land. In terms of utilization, 76% of land were cultivated, 6% Leased out while 18% were left fallow. Land utilization in Tsirang was 90%, Punakha 79% Dagana 77% and Wangdue 62%. Altitude wise, HH in higher altitude (>1601m) had more land (Ave. 5.49 acre) with more Wet land (Ave. 3.47 acre). Mid-range (1001~1600m) had less land (Ave. 3.97acre) but utilization ratio was high.

Table 1-11: Household Average Land Holding (in Acre)

	No. of Farmer	Land Hold	Cultivated	Leased out	Leased in	Fallowed	Utilization (%)
Punakha	42	4.09	3.23	0.10	0.52	0.63	79%
1001~1600m (Ave.1420m)							
Wet Land	20	2.06	1.82	0.18	0.52	0.07	88%
Dry land	20	1.76	1.40	0.00	0.00	0.41	79%
(Total)	20	3.82	3.22	0.18	0.52	0.47	84%
>1601m (Ave.1785m)							
Wet Land	22	2.63	2.32	0.00	0.52	0.21	88%
Dry land	22	1.40	0.82	0.03	0.02	0.55	59%
(Total)	22	4.03	3.14	0.03	0.54	0.76	78%
Wangdue	49	5.26	3.24	0.57	0.69	1.45	62%
<1000m (Ave. 864m)							
Wet Land	7	2.56	1.20	0.36	0.15	1.01	47%
Dry land	7	1.25	0.56	0.00	0.02	0.69	45%
(Total)	7	3.81	1.76	0.36	0.16	1.70	46%
1001~1600m (Ave.1474m)							
Wet Land	17	3.30	2.51	0.47	0.92	0.31	76%
Dry land	17	1.17	0.54	0.12	0.03	0.52	46%
(Total)	17	4.47	3.05	0.59	0.95	0.83	68%
>1601m (Ave.1909m)							
Wet Land	25	4.49	2.65	0.60	0.54	0.12	59%
Dry land	25	1.71	1.13	0.03	0.10	0.56	66%
(Total)	25	6.21	3.78	0.62	0.63	0.68	61%
Tsirang	43	4.2	3.77	0.12	0.24	0.33	90%
<1000m (Ave. 834m)							
Wet Land	17	1.22	1.06	0.00	0.08	0.17	86%
Dry land	17	2.62	2.21	0.00	0.47	0.41	84%
(Total)	17	3.84	3.26	0.00	0.55	0.58	85%
1001~1600m (Ave.1345m)							
Wet Land	26	1.21	0.91	0.19	0.03	0.10	76%
Dry land	26	3.26	3.20	0.00	0.00	0.06	98%
(Total)	26	4.46	4.11	0.19	0.03	0.16	92%
Dagana	50	6.47	5.00	0.27	0.00	1.19	77%
<1000m (Ave. 850m)							
Wet Land	24	2.20	1.19	0.18	0.00	0.83	54%
Dry land	24	4.53	3.56	0.00	0.00	0.97	79%
(Total)	24	6.73	4.75	0.18	0.00	1.80	71%
1001~1600m (Ave.1234m)							
Wet Land	21	1.61	1.17	0.12	0.00	0.32	73%
Dry land	21	1.49	1.43	0.00	0.00	0.06	96%
(Total)	21	3.10	2.60	0.12	0.00	0.38	84%
>1601m (Ave.1752m)							
Wet Land	5	2.06	0.66	1.40	0.00	0.00	32%
Dry land	5	6.27	6.03	0.00	0.00	0.24	96%
(Total)	5	8.33	6.69	1.40	0.00	0.24	80%

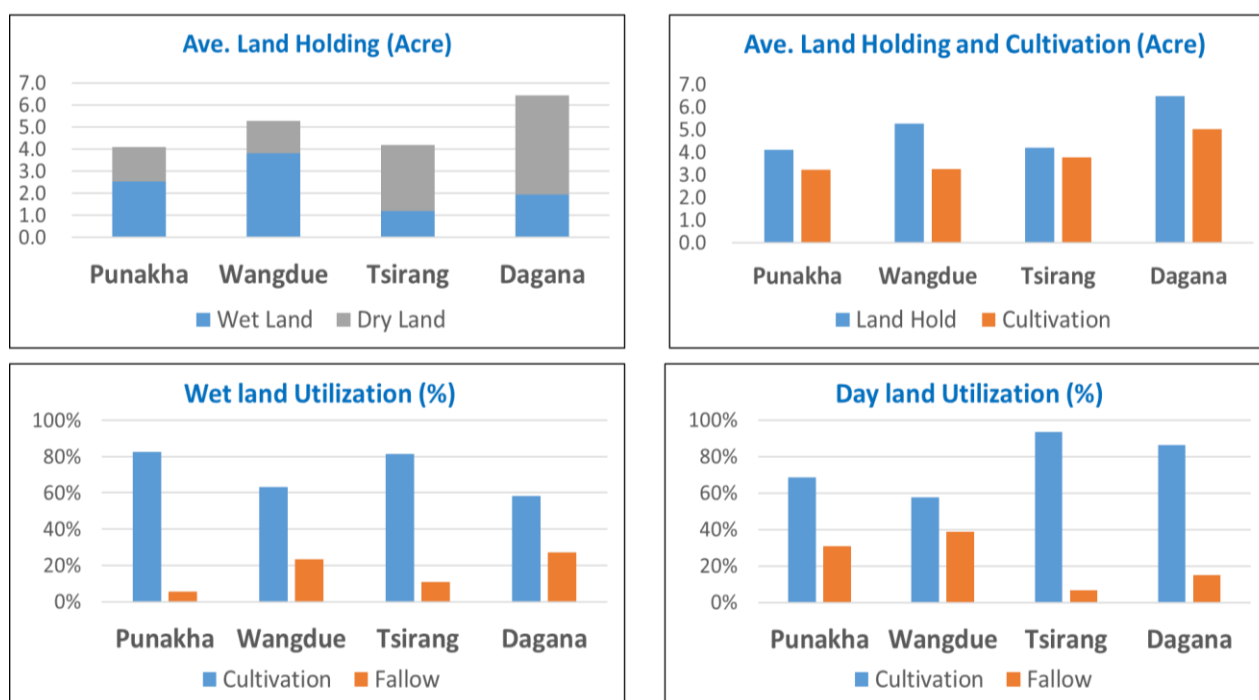


Figure 1-12: Household landholdings (acre) and utilization (%) in Dzongkhag



Figure 1-13: Household landholding (acre) and utilization (%) by MASL

There were several reasons for keeping their land uncultivated. The main reasons were Lack of Irrigation (28%), Labour Shortage (22%), Not Suitable for cultivation (20%) and Wild Animal (18%). Wild Animal depredation (32%) was top in Punakhaband followed by issue of Labour Shortage (23%) and Not Suitable for cultivation (23%) in Wangdue, Lack of Irrigation was top in Tsirang (55%) followed by Dagana (36%). Altitude wise, Labour Shortage and Wild Animal were higher in high altitude area.

Table 1-12: Various reasons for Fallow land

	No. of Farmer	Lack Irrigation	Not Suitable	Labour	Market Access	Wild Animal	N.A
Punakha							
1001~1600m (Ave.1420m)							
Wet Land	20	1	1		0		
Dry land	20	3	0	1	0	2	1
(Total)	20	4	1	1	0	2	1
>1601m (Ave.1785m)							
Wet Land	22	2	1				
Dry land	22	2		4		5	1
(Total)	22	4	1	4	0	5	1
Wangdue							
<1000m (Ave. 864m)							
Wet Land	7	2	2	2			
Dry land	7			2	1	2	
(Total)	7	2	2	4	1	2	0
1001~1600m (Ave.1474m)							
Wet Land	17	1	2	0	1	1	1
Dry land	17	0	2	3	2	1	0
(Total)	17	1	4	3	3	2	1
>1601m (Ave.1909m)							
Wet Land	25	6	1	2	2	2	1
Dry land	25	2	4	3	1	2	1
(Total)	25	8	5	5	3	4	2
Tsirang							
<1000m (Ave. 834m)							
Wet Land	17	2					
Dry land	17	2				1	
(Total)	17	4	0	0	0	1	0
1001~1600m (Ave.1345m)							
Wet Land	26	2		2			
Dry land	26		1			1	
(Total)	26	2	1	2	0	1	0
Dagana							
<1000m (Ave. 850m)							
Wet Land	24	4	3	2		1	
Dry land	24	3		1	1		
(Total)	24	7	3	3	1	1	0
1001~1600m (Ave.1234m)							
Wet Land	21	2					1
Dry land	21			1			
(Total)	21	2	0	1	0	0	1
>1601m (Ave.1752m)							
Wet Land	5						1
Dry land	5			1			
(Total)	5	0	0	1	0	0	1

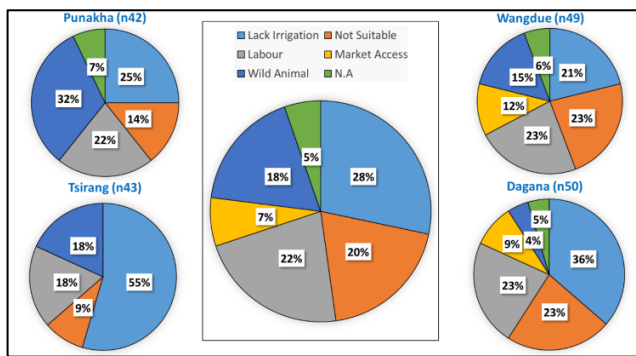


Figure 1-14: Reasons for keeping land fallow (%)

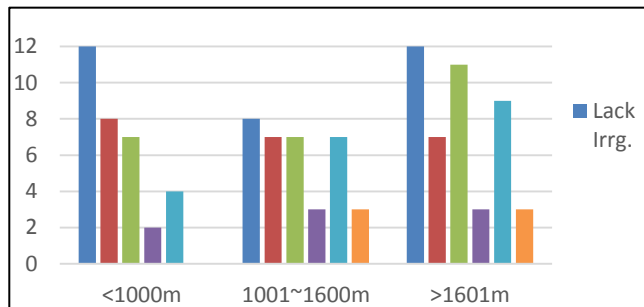


Figure 1-15: Reason for fallow land by MASL

1.6 Agricultural Infrastructure and Inputs

1.6.1 Water/Irrigation Availability

60% of HH had Not Sufficient water for irrigation. In Tsirang and Dagana water scarcity was serious problem since there was less Community Irrigation availability with 49% and 30%, respectively. They depended on Rain for irrigation (Tsirang 44%, Dagana 56%). In Wangdue, there was high ratio of Community Irrigation (92%), however, 61% mentioned that water is not sufficient.

Table 1-13: Water/Irrigation Availability

	No. of Farmer	Water Sufficiency		Water Source			Com. Irrigation Availability	
		Sufficient	Not Sufficient	Rain	Own Irrigation	Community Irrigation	Perennial	Seasonal
Punakha	42	31	11	2	4	36	29	12
Wangdue	49	19	30	1	3	45	21	24
Tsirang	43	10	33	19	3	21	8	13
Dagana	50	13	37	28	7	15	4	11
Total	184	73	111	50	17	117	62	60

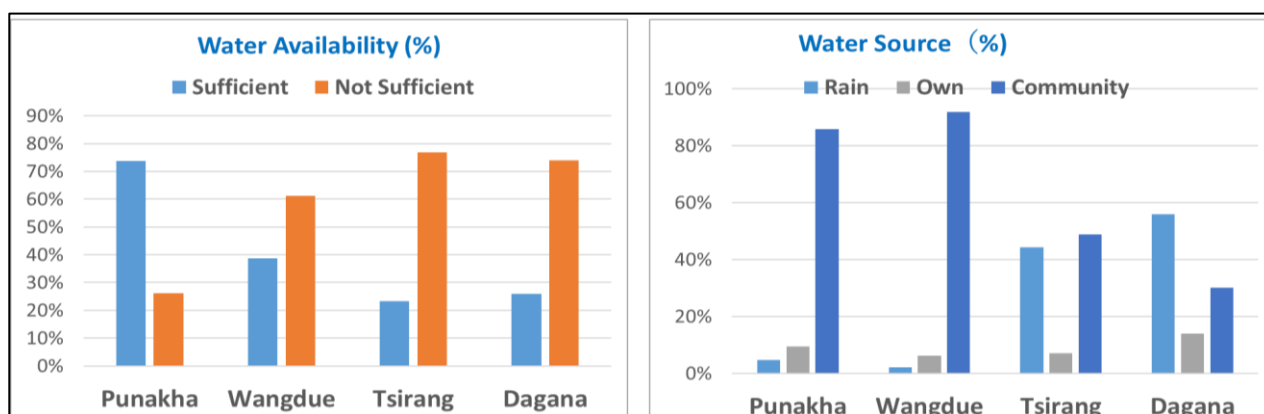


Figure 1-16 Irrigation water availability and sources in four Dzongkhags

1.6.2 Farming Input

About half of farmers use Chemical Fertilizers and Agro-chemicals. Main source of these inputs was NSC/Commission Agent then DAO except Farm Machinery from AMC.

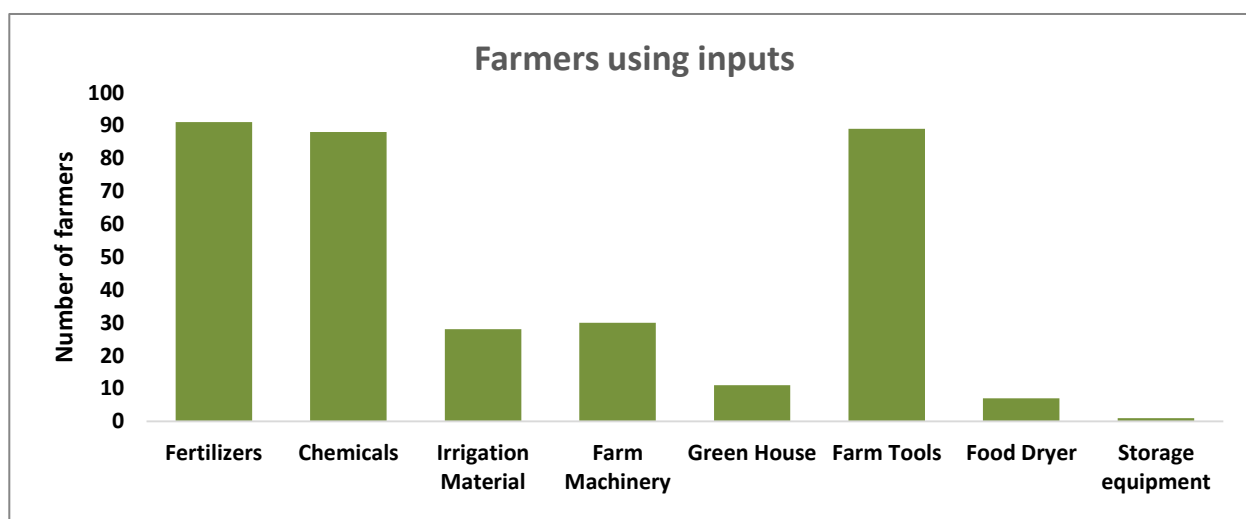


Figure 1-17: Level of inputs use by farmers

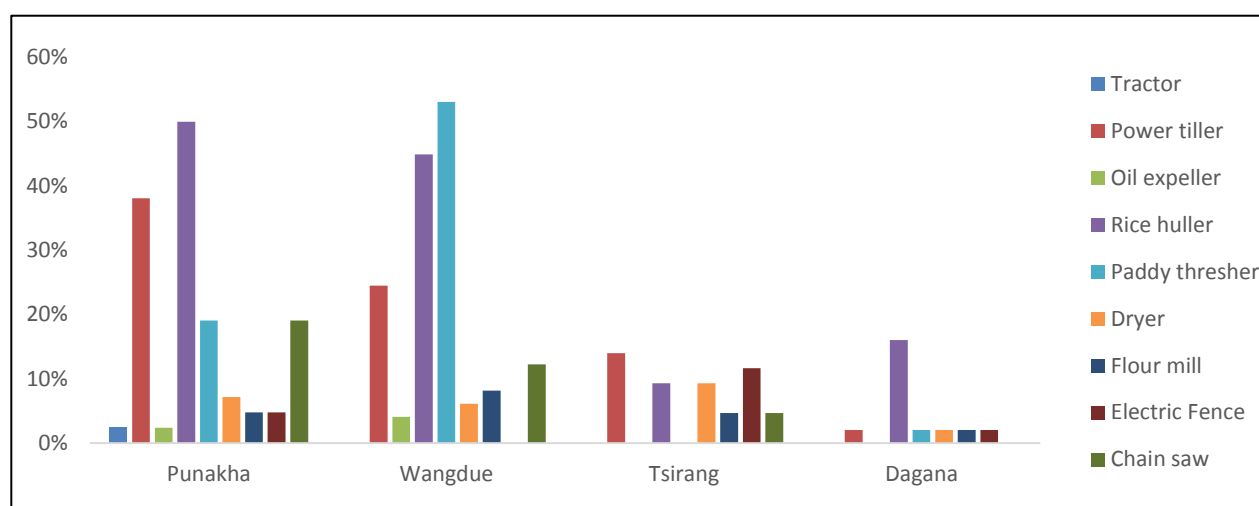
1.6.2.1 Farm Machineries/Facilities

However, the number of Farm Machinery provided by farmer in question “Farming Input” and break down of “Farm Machinery/Facilitates” were not equal. It seemed that number given below was more accurate. HHs in Punakha and Wangdue had more Farm Machineries/Facilities. These machineries were owned by individual except the Electric Fence.

Table 1-14: Holding Farm Machineries and Facilities

	No. of Farmer	Tractor	Power tiller	Rice huller	Paddy thresher	Oil expeller	Dryer	Flour mill	Elect. Fence	* Other
Punakha	42	1	16	21	8	1	3	2	2	8
Wangdue	49		12	22	26	2	3	4		9
Tsirang	43		6	4	0	0	4	2	5	6
Dagana	50		1	8	1	1	1	1	1	0
Total	184	1	35	55	35	4	11	9	8	23

* Other; Such as Chain saw, Bush Cutter, Plainer, Sprayer

**Figure 1-18: Farm machinery holding and facilities for different Dzongkhags**

1.6.2.2 Fertilizers and Agro-chemicals

More than half of farmers used Weedicides and 1/3 of them were Pesticides. Weedicides was believed to be used mostly for paddy. Most of farmers evaluated these chemicals as effective chemicals. However, most of them didn't know/remember the name of chemicals thus proper chemical usage remains questionable.

Table 1-15: Agro-Chemical use

Kind	No. of Use	Chemical Name		Evaluation			
		Know	Don't Know	Worked	Neutral	Not Worked	N.A
Weedicide	99	11	88	83	9	5	1
Pesticide	61	7	54	51	4	4	2
Fungicide	12	1	11	10	1	1	0
Rodenticide	14	2	12	13	1	0	0

1.7 Agricultural Activities

1.7.1 Field Crops

73% of Farmers cultivated field crops/cereals. Of which Rice represented 63% followed by Wheat 23%. 13% cultivated Mustard Oil, while Buckwheat and Cassava were cultivated by 12% and 9%. Since most of Field Crops were cultivated for self-consumption, only 22% of cultivated farmers sold Rice. Similarly, 9% of

growers sale Maize for cash. Many farmers were not aware about the yield of crops. Rice cultivation was highest in Punakha (90%) followed by Wangdue (88%). Maize cultivation was highest in Tsirang (77%) after Dagana (84%). Altitude wise, Maize cultivation was found high in Lower (71%) and Mid (70%) MASL elevation. In higher elevation, Rice ranked first (85%) then Wheat (46%). The “Other” were Millet.

Table 1-16: Number of Farmers Cultivated Field Crop in Dzongkhag

	Rice	Wheat	Maize	Buckwheat	Cassava	Mustard Oil	Other
Punakha							
1001~1600	19	5	6	0		3	
>1600	19	5	10			1	
Wangdue							
<1000m	6	2	2	1		0	
1001~1600	15	7	15	1		3	
>1600	22	18	8	3		3	
Tsirang							
>1000m	10	0	13	5	6	5	4
1001~1600	11	1	20	6	4	4	2
Dagana							
>1000m	17	1	19	4	6	2	1
1001~1600	12	2	18	2	0	2	0
<1600	3	1	5	0	0	1	0
Total	134	42	116	22	16	24	7

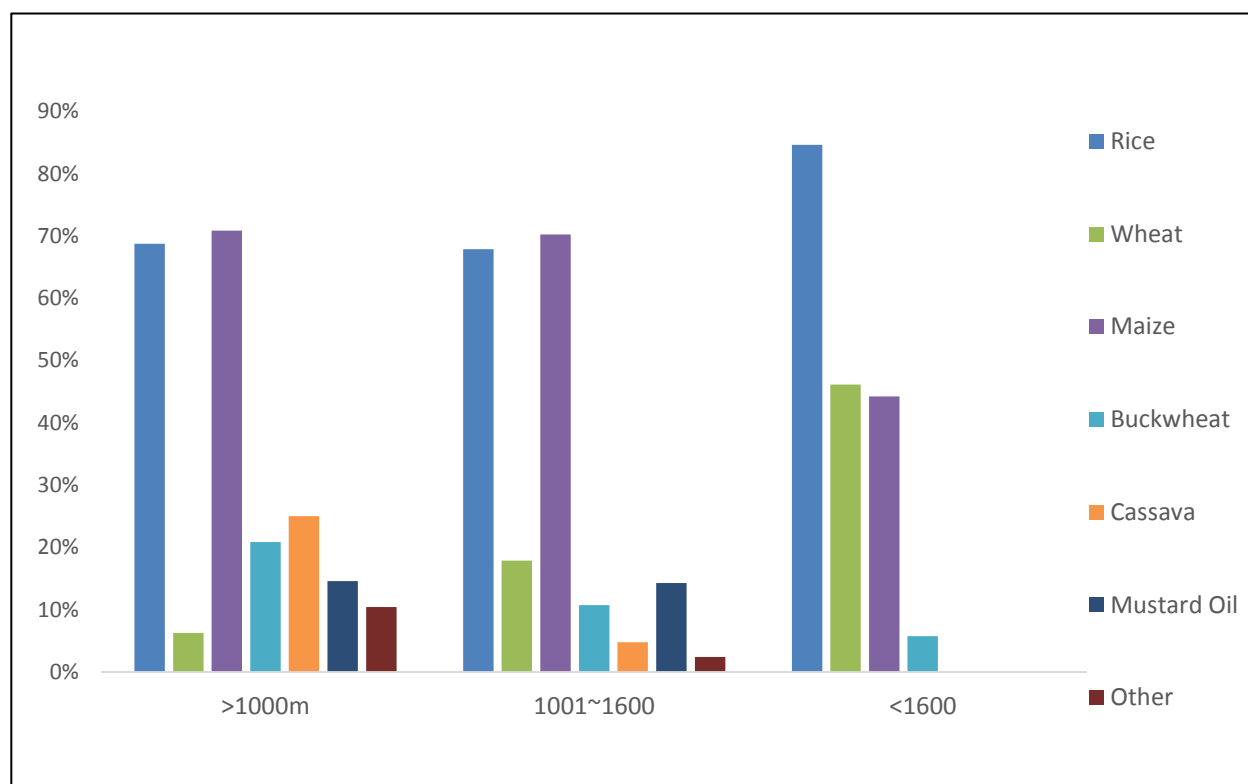


Figure 1-19: Field crops cultivated by farmers in Dzongkhags

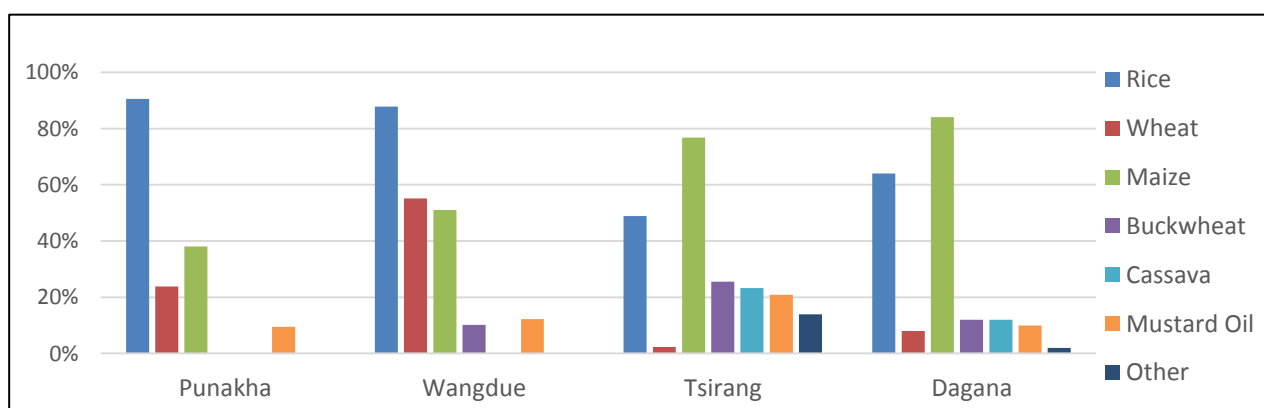


Figure 1-20: Cultivated field crops in MASL (%)

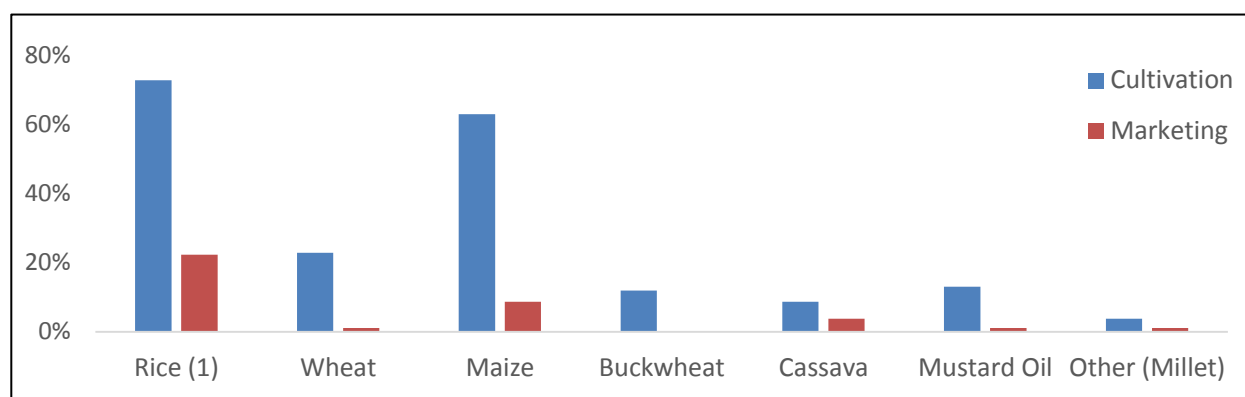


Figure 1-21: Farmers cultivating field crops and marketing (%)

99% of the Rice cultivated were in wet land and account to 64% of wet land on average (Punakha 81%, Tsirang 68%, Wangdue 59%, Dagana 54%). Maize was mostly cultivated in Dry land (94%) and occupy 27% of the Dry land area (Tsirang almost 100%, Dagana 57%), Wheat was cultivated both in Wet land (58%) and Dry land (42%) and that accounted to 4% of the total Wet land and 3% of the total Dry land area.

Table 1-17: Land area (Acre) under Field Crop Cultivation

	Punakha		Wangdue		Tsirang		Dagana		Total		
	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Total
Rice	85.4	0.3	109.5	0.0	35.0	0.2	52.5	1.0	282.4	1.5	283.9
Wheat	3.4	0.0	14.6	7.6	0.1	0.0	0.0	5.5	18.1	13.1	31.2
Maize	3.2	6.6	0.4	3.8	2.5	52.5	3.4	54.7	9.5	117.6	127.1
Buckwheat	0.0	0.0	3.0	1.5	0.8	3.9	1.3	1.7	5.1	7.1	12.2
Cassava	0.0	0.0	0.0	0.0	0.7	0.3	0.0	0.5	0.7	0.8	1.5
Mustard Oil	1.7	0.0	0.8	0.9	0.0	6.5	0.0	2.0	2.5	9.4	11.9
Other (Millet)	0.0	0.0	0.0	0.0	0.2	4.3	0.0	0.7	0.2	5.0	5.2

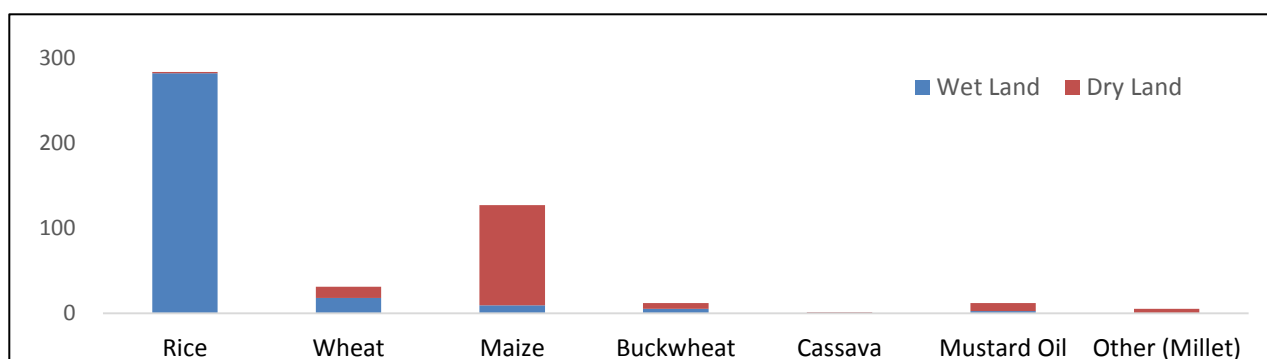


Figure 1-22: The land area (acre) under field crop cultivation

1.7.2 Vegetables

1.7.2.1 Vegetable Cultivation

A total of 41 Vegetables were cultivated in a total area of 159 acres (Wet land 47 acres, Dry land 112 acres). Chili was the most popular among the farmers in terms of number of farmers involved, cultivated land area, production and income generated. Number of farmers who cultivated Chili was 80%, followed by Mustard Green (67%), Radish (63%), Broccoli (55%), Coriander (54%), Green Bean (53%) and Cabbage (50%). In addition, area under cultivation was highest for Chili (27 acre) followed by Potato (14 acre), Broccoli (13 acre), Pumpkin and Radish (11 acre). Chili and Broccoli were mostly cultivated in wet land while other vegetables were cultivated in Dry land. Popular vegetable were varied as preferred vegetable in Punakha were Chili, Coriander and Broccoli while Chili, Radish, Coriander were preferred in Wangdue. In Tsirang; Mustard green, Radish, Pumpkin were opted while Dagana look up to Mustard green, Chili, Radish.

Table 1-18: Number of Farmers and Land area (Acre) under Top 20 Vegetable Cultivation

Crop	Punakha (n42)			Wangdue (n49)			Tsirang (n43)			Dagana (n50)		
	Cul. No.	Wet Land	Dry Land	Cul. No.	Wet Land	Dry Land	Cul. No.	Wet Land	Dry Land	Cul. No.	Wet Land	Dry Land
Chili	34	6.7	2.9	40	3.9	6.1	34	2.3	1.3	39	0.1	3.8
Mustard green	17	0.5	1.1	22	1.0	0.5	43	0.1	2.0	41	0.1	4.0
Radish	14	1.2	0.7	26	0.1	2.5	38	0.1	2.0	38	0.1	3.8
Broccoli	20	1.2	1.2	24	5.0	0.8	32	0.7	1.0	26	0.7	2.4
Coriander	21	0.6	1.6	26	0.2	0.3	29	0.0	0.5	24	0.0	0.4
Green Bean	16	2.2	0.4	21	0.6	1.3	31	0.2	1.6	29	0.0	2.8
Cabbage	12	1.2	0.5	14	0.3	1.9	34	0.8	1.3	32	0.2	2.1
Pumpkin	5	0.2	0.1	12	0.1	0.2	36	0.2	1.8	37	0.0	8.0
Onion	12	0.6	0.9	24	0.4	0.5	27	0.5	0.7	19	0.0	1.7
Potato	9	0.8	0.8	18	2.2	1.9	26	0.9	2.8	24	0.8	4.1
Cauliflower	8	0.5	0.5	11	0.3	1.1	25	0.3	0.8	20	0.1	1.2
Squash	5	0.0	0.4	7	0.1	0.1	29	0.1	1.3	22	0.0	0.5
Pea	8	0.1	0.6	10	0.6	0.6	21	0.1	0.4	17	0.0	2.2
Bunching onion	9	0.4	0.4	6	0.2	0.1	24	0.0	0.6	16	0.1	0.3
Chili (Doley)	9	0.8	0.2	10	0.2	0.4	16	0.0	0.1	18	0.0	0.4
Brinjal	1	0.1	0.0	7	0.4	0.6	23	0.0	0.6	22	0.0	0.4
Tomato	6	0.4	0.6	6	0.2	0.1	18	0.2	0.3	23	0.1	0.6
Cucumber	9	0.3	0.2	9	0.0	0.3	19	0.1	0.2	13	0.0	1.5
Carrot	7	0.5	0.7	2	0.0	0.1	29	0.1	0.6	12	0.0	0.2
Tree Tomato	10	0.0	0.0	5	0.0	0.0	19	0.0	0.0	15	0.0	0.0

There was not much difference in terms of popularity of vegetables by altitude except Pumpkin. It ranked 3rd in elevation of <1000m but 8th in mid and high altitude zone. Broccoli was 4th in mid and high but 7th in lower altitude area. In general, mid altitude cultivated land area was larger. Chili, Radish and Green Bean were mostly cultivated in higher altitude. Pumpkin, Kidney bean and Onion were relatively abundant in lower altitude.

Table 1-19: Top 20 Vegetable Cultivation by MASL (Farmers No. and Land area)

Crops	<1000m (n48)			1001~1600m (n84)			>1600m (n52)			Total Cul. No.	Total Ave. (Acre)
	Cul. No	Total. (Acre)	Ave. (Acre)	Cul. No	Total. (Acre)	Ave. (Acre)	Cul. No	Total. (Acre)	Ave. (Acre)		
Chili	38	4.4	0.092	63	11.0	0.131	46	9.3	0.179	147	0.401
Mustard green	38	2.8	0.059	63	4.5	0.054	22	1.9	0.037	123	0.150
Radish	32	2.3	0.047	56	4.8	0.057	28	3.6	0.069	116	0.172
Broccoli	29	1.8	0.037	45	4.4	0.053	28	2.1	0.040	102	0.129
Coriander	28	0.5	0.010	43	1.7	0.021	29	1.3	0.025	100	0.056
Green Bean	31	2.0	0.041	41	3.8	0.046	25	3.2	0.062	97	0.148
Cabbage	32	1.6	0.033	43	4.2	0.049	17	2.5	0.048	92	0.131
Pumpkin	34	2.7	0.056	43	7.5	0.090	13	0.3	0.006	90	0.152
Onion	26	1.8	0.037	33	2.2	0.026	23	1.1	0.021	82	0.084
Potato	26	3.5	0.073	34	7.4	0.088	17	3.3	0.064	77	0.225
Cauliflower	20	0.8	0.017	32	2.5	0.030	12	1.4	0.027	64	0.073
Squash	26	0.6	0.012	26	1.4	0.016	11	0.5	0.010	63	0.038
Pea	17	0.9	0.018	24	1.7	0.020	15	2.1	0.041	56	0.079
Bunching onion	21	0.5	0.011	29	1.1	0.013	5	0.3	0.006	55	0.030
Tomato	26	0.7	0.015	22	1.2	0.015	5	0.4	0.008	53	0.038
Brinjal	19	0.2	0.003	23	1.0	0.012	11	1.0	0.019	53	0.035
Chili (Doley)	18	0.3	0.007	29	1.6	0.020	6	0.1	0.002	53	0.028
Carrot	16	1.5	0.032	22	0.7	0.008	12	0.5	0.009	50	0.049
Cucumber	17	0.4	0.009	23	0.5	0.006	10	0.6	0.011	50	0.026
Tree Tomato	13	0.0	0.000	26	0.0	0.000	10	0.0	0.000	49	0.000

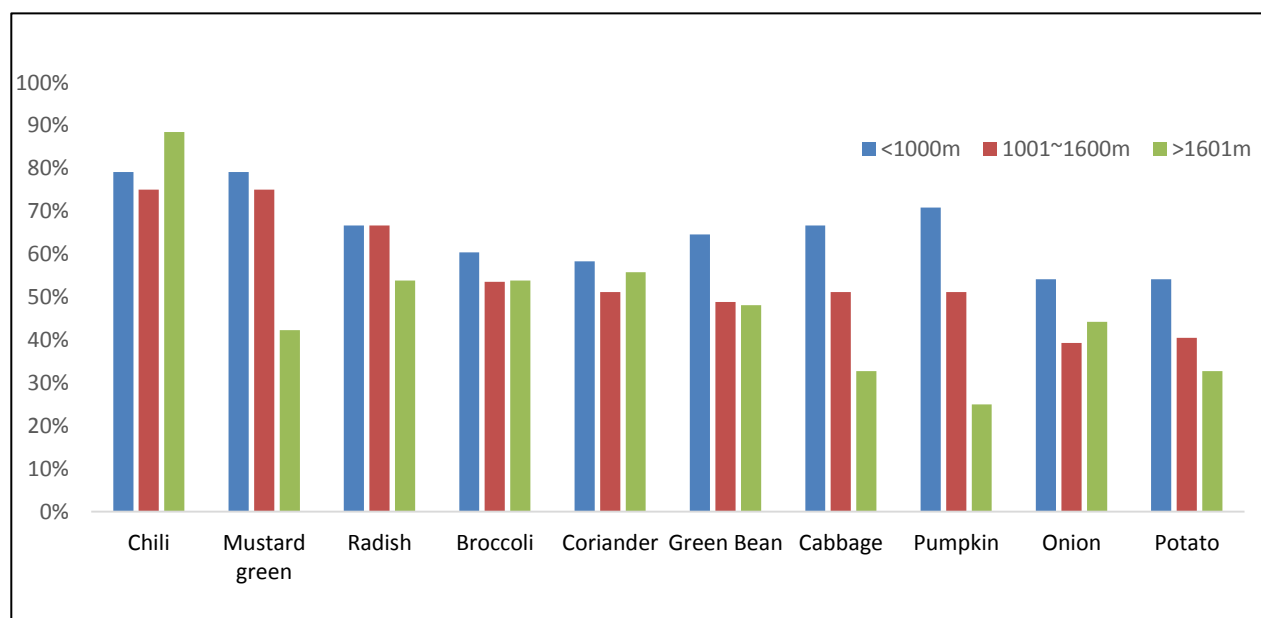


Figure 1-23: Top 10 Vegetable Cultivated Farmers by MASL (%)

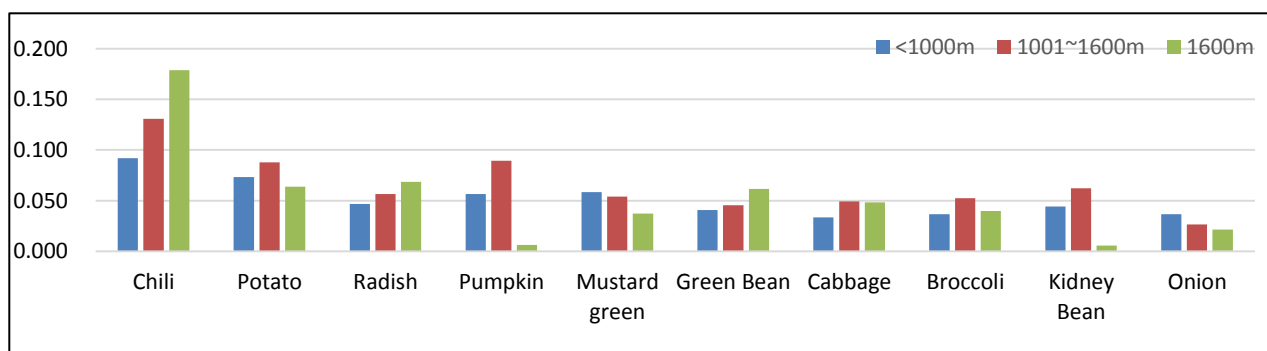


Figure 1-24: Top 10 Vegetable Ave. Cultivated Land by MASL (Acer)

1.7.2.2 Vegetable Seed and Seedling

Main Source of Vegetable Seed and Seedling were from Dzongkhag supplied by DAO (71%), followed by NSC/Commission Agent (23%). Only about 1% of seeds and seedlings were supplied by ARDC Bajo. 74% of the beneficiaries were satisfied with the seed/seedling provided. 11% of those who received seeds and seedlings were not-satisfied. The main issue with those were not-satisfied was poor quality (80%).

Table 1-20: Top 15 Vegetable Seed/Seedling Source and Evaluation

	DAO	ARDC	NSC/ Com. Agent	Prive. Enterp rise	Seed/Se edling Grow.	Neigh bor	Othe r	Total	Quality Evaluation			
									N.A	Satisfi ed	Neut ral	Not Satis.
Cabbage	81	1	26	0	0	0	0	108	2	86	11	9
Broccoli	51	0	28	1	0	0	0	80	0	67	8	5
Radish	52	1	15	3	2	0	0	73	4	56	5	8
Onion	49	1	5	0	0	0	0	55	3	37	7	8
Green Bean	42	1	7	0	0	1	0	51	0	38	9	4
Cauliflower	30	1	15	1	0	1	0	48	6	38	2	2
Chili	30	0	9	4	0	1	2	46	1	31	10	5
Mustard green	31	0	10	1	2	0	0	44	0	34	8	2
Carrot	29	0	10	0	0	1	0	40	0	24	6	11
Tomato	26	0	3	0	0	2	0	31	0	18	5	8
Pea	15	0	4	0	0	0	1	20	0	15	2	3
Cucumber	13	0	6	0	0	0	0	19	1	13	3	2
Kidney Bean	13	0	5	0	0	0	0	18	0	15	1	2
Brinjal	9	0	6	0	0	1	0	16	1	9	3	4
Potato	9	0	4	0	0	0	1	14	0	13	1	0

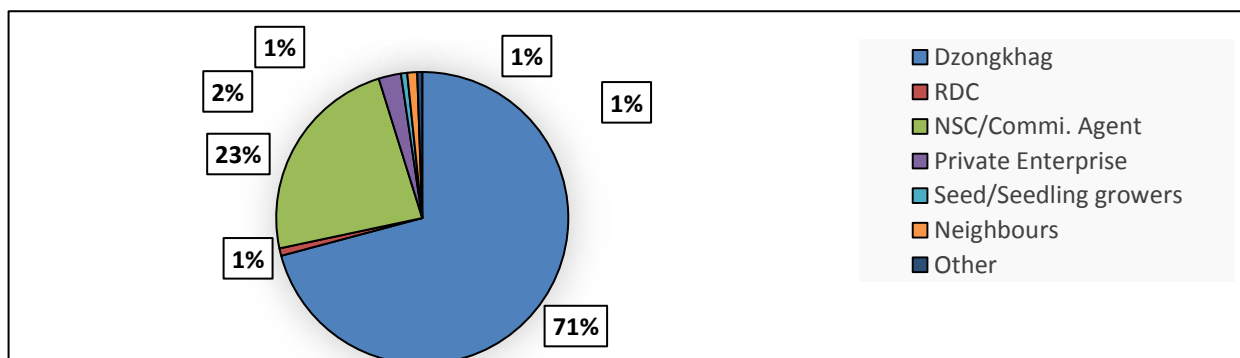


Figure 1-25: Vegetable seeds and seedling sources

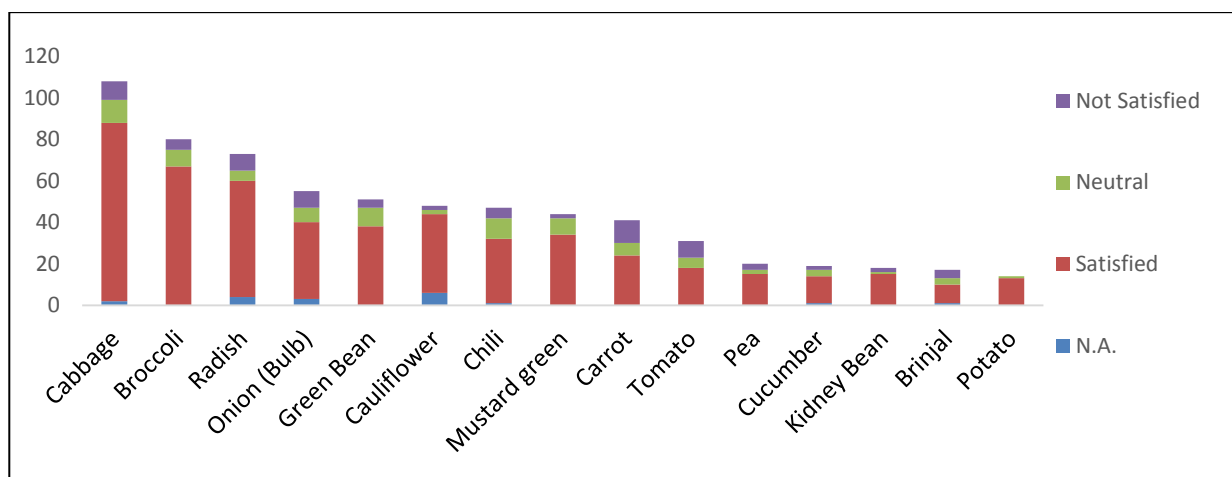


Figure 1-26: Top 15 vegetables seed/seedling evaluation (No)

Only 15 Farmers (8%) out of 184 were engaged in selling of 16 vegetable seeds/seedlings of which 34% marketed it in their village or to neighbors. Only 26% of them sale in town/market.

Table 1-21: Vegetables Seed/Seedling Marketing

Total 15 Farmers	Sell at/to (Market)							
	Town/Market	In village /Neighbor	Road side	NSC/ Com. Agent	Religi ous Instit.	DAO/ Gewog	School	Total
Chili	4	3	1			1		9
Mustard green	1	2	1	1				5
Kidney Bean	1	2		1				4
Potato		1		1	1			3
Brinjal	2							2
Broccoli	1	1						2
Chili (Doley)	1		1					2
Pea					1	1		2
Radish		1			1			2
Asparagus		1						1
Cabbage	1							1
Coriander			1					1
Ginger		1						1
Onion (Bulb)		1						1
Pumpkin							1	1
Squash				1				1
Total	11	13	4	4	3	2	1	38

1.7.2.3 Vegetable Production

Chili and Green Beans were mostly produced in Punakha and Wangdue while Broccoli was largely cultivated in Tsirang. Pumpkin is mostly cultivated in Dagana. There is also a tendency of farmers to feed with lower figure on production and their income. Also, some farmers who were not selling their produce were unable to give production figure

Table 1-22: Top 20 Vegetable Production (Kg)

	Total (kg)		Punakha (n42)		Wangdue(n49)		Tsirang (n43)		Dagana (n50)	
	Total	*CF Ave.	Total	*CF Ave.	Total	*CF Ave.	Total	*CF Ave.	Total	*CF Ave.
Chili	71,020	483	37,786	900	26,850	548	3,685	86	2,699	63
Potato	28,725	373	5,030	120	15,450	315	3,245	75	5,000	116
Green Bean	23,704	244	9,795	233	10,667	218	1,520	35	1,722	40
Mustard green	22,194	180	2,677	64	11,423	233	4,549	106	3,545	82
Broccoli	21,120	207	1,752	42	2,185	45	15,523	361	1,660	39
Pumpkin	19,154	213	855	20	1,732	35	5,335	124	11,232	261
Squash	14,990	238	1,450	35	1,065	22	5,815	135	6,660	155
Cabbage	14,514	158	1,360	32	3,487	71	5,630	131	4,037	94
Radish	14,476	125	2,900	69	3,320	68	4,155	97	4,101	95
Cucumber	8,170	163	3,880	92	530	11	3,414	79	346	8
Cauliflower	7,406	116	1,162	28	3,347	68	1,641	38	1,256	29
Brinjal	5,739	108	2,379	57	2,632	54	511	12	217	5
Chili (Doley)	4,331	82	4	0	3,520	72	553	13	254	6
Bunching onion	4,075	74	2,950	70	135	3	585	14	405	9
Onion	4,063	50	960	23	908	19	1,437	33	758	18
Kidney Bean	4,003	118	2,085	50	396	8	213	5	1,309	30
Pea	3,930	70	635	15	967	20	837	19	1,491	35
Slippers Gourd	3,918	112	52	1	3,055	62	439	10	372	9
Coriander	2,969	30	1,806	43	755	15	186	4	222	5
Tomato	2,662	50	1,125	27	645	13	481	11	411	10

CF: Cultivated Farmer

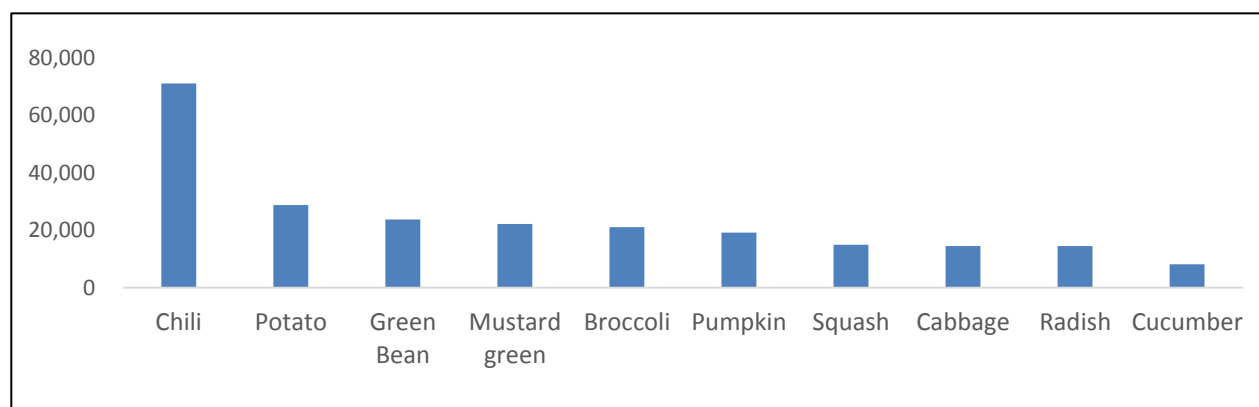


Figure 1-27: Top 10 vegetable Production (kg)

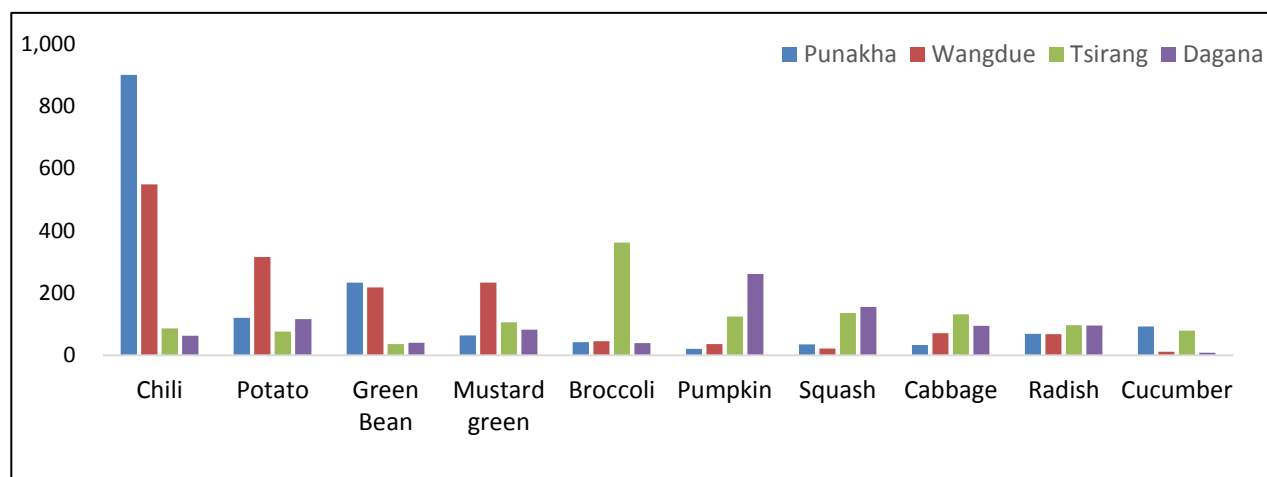


Figure 1-28: Average production of top 10 vegetable crop

1.7.2.4 Vegetable Marketing and Income

About 50% of top 20 vegetable cultivated farmers sold their product (Chili 55%, Doley 43%, Green Bean 57%, Potato 49%, Broccoli 63%).

Table 1-23: Top 20 Vegetable Marketing and Income (Nu.)

Crops	Marketing Farmer	Income (Nu)		Market							
		Total	*MF Ave.	Neighbour	Road-side Market	Town Market	Big City	Buyer/Vendor	School	Religious Instit.	Projects
Chili	81	2,928,775	36,158	3	6	50	9	9	2	0	2
Chili (Doley)	23	497,230	21,619	1	0	12	2	7	0	0	1
Green Bean	55	493,160	8,967	2	6	33	6	6	2	0	0
Potato	38	351,130	9,240	2	1	24	4	2	2	1	2
Broccoli	64	299,739	4,683	1	3	43	7	3	1	2	4
Cauliflower	37	265,020	7,163	0	1	27	3	4	1	0	1
Mustard green	64	243,786	3,809	6	8	32	4	9	2	1	2
Cabbage	46	196,217	4,266	1	3	30	2	4	3	0	3
Coriander	52	170,915	3,287	0	9	31	5	3	2	0	2
Onion	46	117,355	2,551	3	6	28	2	5	0	1	1
Brinjal	24	114,081	4,753	3	1	15	3	0	1	0	1
Cucumber	25	101,875	4,075	1	5	12	4	3	0	0	0
Kidney Bean	21	96,793	4,609	5	2	9	1	3	0	0	1
Slippers Gourd	14	92,320	6,594	1	1	11	0	0	0	0	1
Tomato	25	91,115	3,645	2	4	15	1	1	1	1	0
Pea	28	85,433	3,051	1	3	17	3	1	0	0	3
Radish	34	65,780	1,935	2	4	20	2	4	0	1	1
Asparagus	8	61,165	7,646	0	0	5	1	0	1	0	1
Tree Tomato	25	53,905	2,156	2	1	15	1	4	1	0	1
Squash	19	49,085	2,583	1	1	12	2	2	1	0	0

* Marketing farmer's average income

Most of the farmers sell their produce in Town/Weekend Market (61%). Road side seller and Buyer/Vendor constituted only 9% while 8% of them sell their produce in Big City. The selling to Buyer/Vendor and Neighbour (in Village) ratio was relatively higher in Tsirang and Dagana which can be attributed poor market accessibility and lower number of consumers in the area.

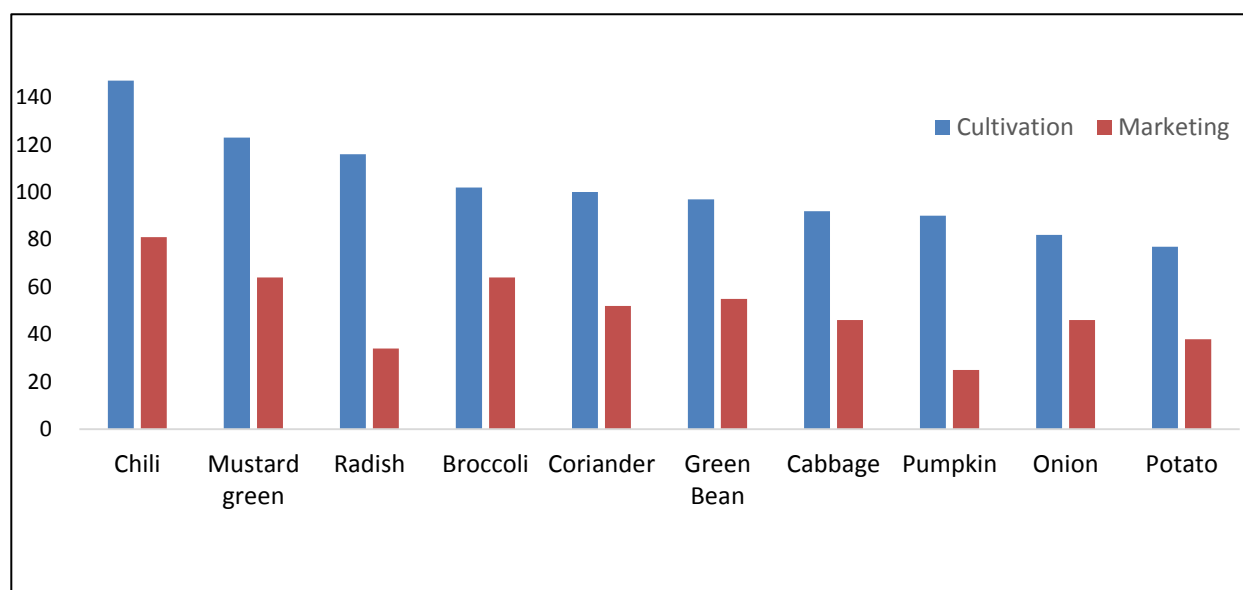


Figure 1-29: Number of farmers cultivating and marketing Top 10 vegetable

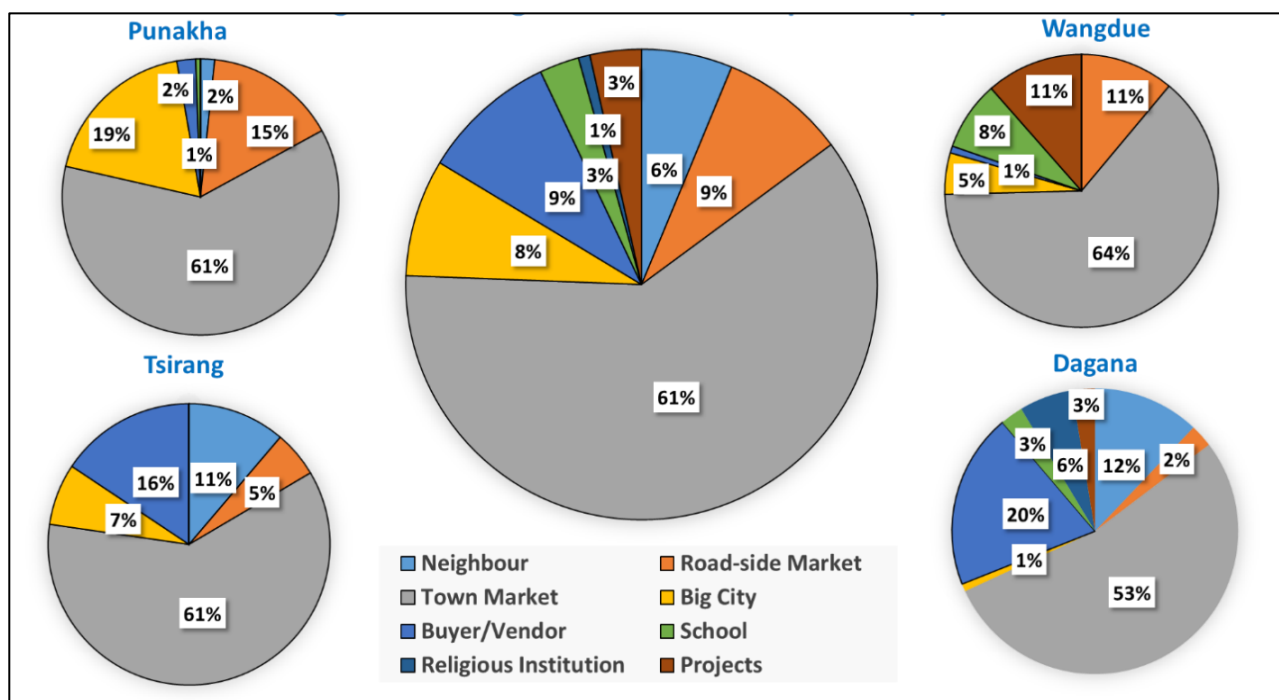


Figure 1-30: Different markets for vegetables

Dzongkhag wise, Punakha and Wangdue had higher production, marketing ratio and income than Tsirang and Dagana. It considered that Tsirang and Dagana is disadvantaged with market accessibility for vegetable produce and it course lower figure of the production, marketing ratio and income. Hence, they were more rely on industrial crops (mainly Cardamom, Garlic) and fruit (mainly Mandarin, Banana) which has longer shelf life, transportability and the Buyer/Vender come to collect from them.

Table 1-24: Top 10 Income from Vegetable and its Production in Dzongkhag

	*CF No.	Production (Kg)		Marketing		Income (Nu)		
		Total	*CF Ave.	No.	%/T-Cul	Total	**MF Ave.	**MF Max.
Punakha (n42)								
Chili	34	37,786	1,111	23	68%	1,950,600	57,371	400,000
Green Bean	16	9,795	612	15	94%	290,700	18,169	150,000
Broccoli	20	1,752	88	18	90%	110,332	5,517	28,000
Coriander	21	1,806	86	16	76%	106,495	5,071	30,000
Brinjal	9	2,379	264	7	78%	67,520	7,502	45,000
Cucumber	7	3,880	554	7	100%	64,500	9,214	40,000
Potato	9	5,030	559	8	89%	64,500	7,167	40,000
Kidney Bean	6	2,085	348	6	100%	58,813	9,802	35,000
Tomato	6	1,125	188	5	83%	54,100	9,017	40,000
Mustard green	17	2,677	157	12	71%	44,975	2,646	15,000
Wangdue (n49)								
Chili	40	26,850	671	28	70%	754,425	26,944	160,000
Chili (Doley)	7	3,520	503	6	86%	253,000	42,167	100,000
Potato	18	15,450	858	14	78%	216,550	15,468	94,500
Cauliflower	11	3,347	304	10	91%	162,150	16,215	50,000
Green Bean	21	10,667	508	14	67%	155,100	11,079	55,000
Mustard green	22	11,423	519	16	73%	107,550	6,722	30,000
Broccoli	24	2,185	91	17	71%	97,297	5,723	27,477
Slippers Gourd	12	3,055	255	9	75%	86,000	9,556	40,000
Cabbage	14	3,487	249	10	71%	82,150	8,215	30,800
Coriander	26	755	29	20	77%	38,720	1,936	10,000
Tsirang (n43)								
Chili (Doley)	23	553	24	14	61%	240,190	17,156	15,000
Chili	34	3,685	108	23	68%	149,100	6,483	50,000
Broccoli	32	15,523	485	21	66%	66,410	3,162	15,000
Cauliflower	25	1,641	66	17	68%	65,575	3,857	36,000
Mustard green (Saag)	43	4,549	106	25	58%	62,505	2,500	15,000
Cabbage	34	5,630	166	19	56%	58,425	3,075	13,000
Onion (Bulb)/Spring onion	27	1,437	53	12	44%	42,995	3,583	18,000
Green Bean	31	1,520	49	19	61%	40,760	2,145	7,000
Cucumber	29	3,414	118	16	55%	30,175	1,886	5,000
Potato	26	3,245	125	11	42%	25,580	2,325	8,000
Dagana (n50)								
Chili	39	2,699	69	7	18%	74,650	10,664	25,000
Potato	24	5,000	208	5	21%	44,500	8,900	15,000
Mustard green (Saag)	41	3,545	86	11	27%	28,756	2,614	12,000
Broccoli	26	1,660	64	8	31%	25,700	3,213	7,500
Cauliflower	20	1,256	63	6	30%	21,925	3,654	12,000
Cabbage	32	4,037	126	9	28%	20,842	2,316	6,000
Squash	22	6,660	303	3	14%	19,000	6,333	15,000
Pea	17	1,491	88	4	24%	17,800	4,450	15,000
Kidney Bean	14	1,309	94	4	29%	16,260	4,065	12,000
Radish	38	4,101	108	8	21%	13,475	1,684	6,000
*CF: Cultivated Farmer, **MF: Marketing Farmer								

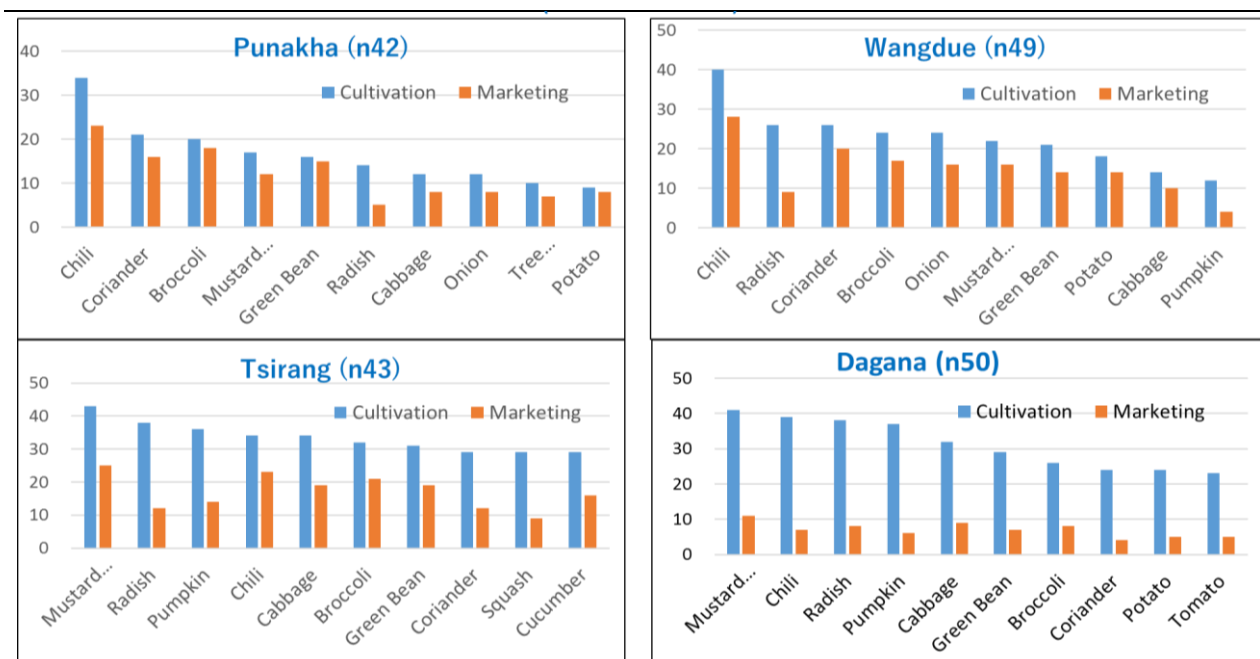


Figure 1-31: Farmers cultivating and marketing top 10 vegetable (No. of farmers)



Figure 1-32: Total production of top 10 vegetables and their average income (Nu.)

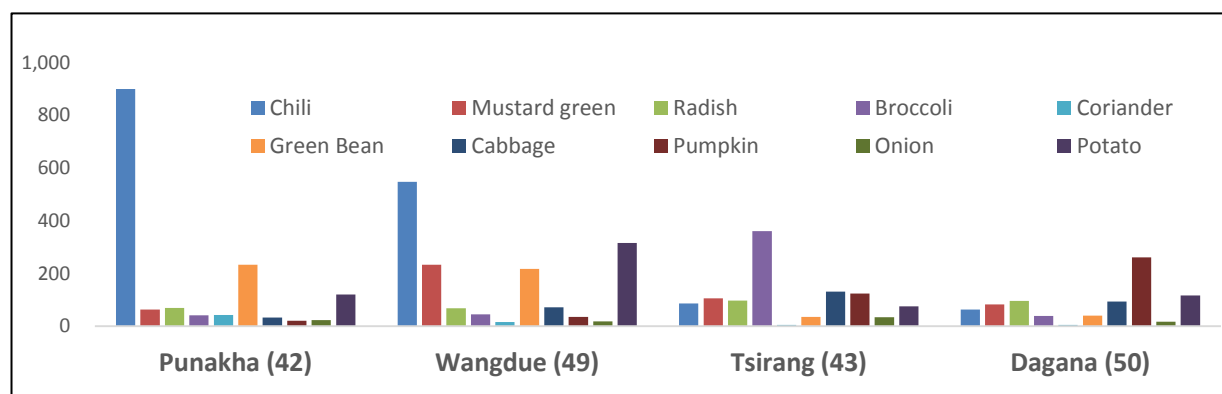


Figure 1-33: Top 10 Vegetable Cultivated Farmers Average Production in Dzongkhag (Kg)

1.7.2.5 Suitable Vegetable Crops

Farmers consider the crop suitability based on several reasons (easiness to cultivate, high demand/price, high yield etc.) of which, farmers considered suitable vegetables were Easy Cultivation (29%) as top, followed by High Demand/Price (23%), High Yield (22%). In Punakha, Chili and Green bean were considered as most suitable while Chili was also preferred in Wangdue. Dagana farmers listed Mustard green, Cabbage and Radish as suitable vegetable. However, in Tsirang, most of listed vegetable were found suitable approximately had even distribution. There was also some listed industrial crop (Cardamom, Garlic).

Table 1-25: Top 11 Suitable Vegetable Crops and Reason

	Total No.	Reason								
		Easy Culti.	High Yield	Pest/ Disease Resis.	High Demand /Price	Multiple Harvest	Easy Transport.	Good shelf life	Relay Cropping	Others
Mustard green	60	56	37	7	27	33	6	0	1	0
Chili	59	28	32	5	49	24	8	7	3	0
Cabbage	54	39	34	6	22	1	8	7	1	0
Broccoli	51	23	21	2	38	8	3	0	0	0
Green Bean	47	35	22	2	28	12	6	5	3	0
Radish	47	42	23	9	11	2	8	6	1	1
Cauliflower	32	15	15	3	23	1	2	0	1	0
Onion (Bulb)	30	21	15	13	17	0	4	8	1	0
Potato	23	15	10	2	9	1	5	9	1	1
Coriander	20	17	11	5	12	4	5	0	0	0
Kidney Bean	20	17	14	5	12	4	1	1	1	1

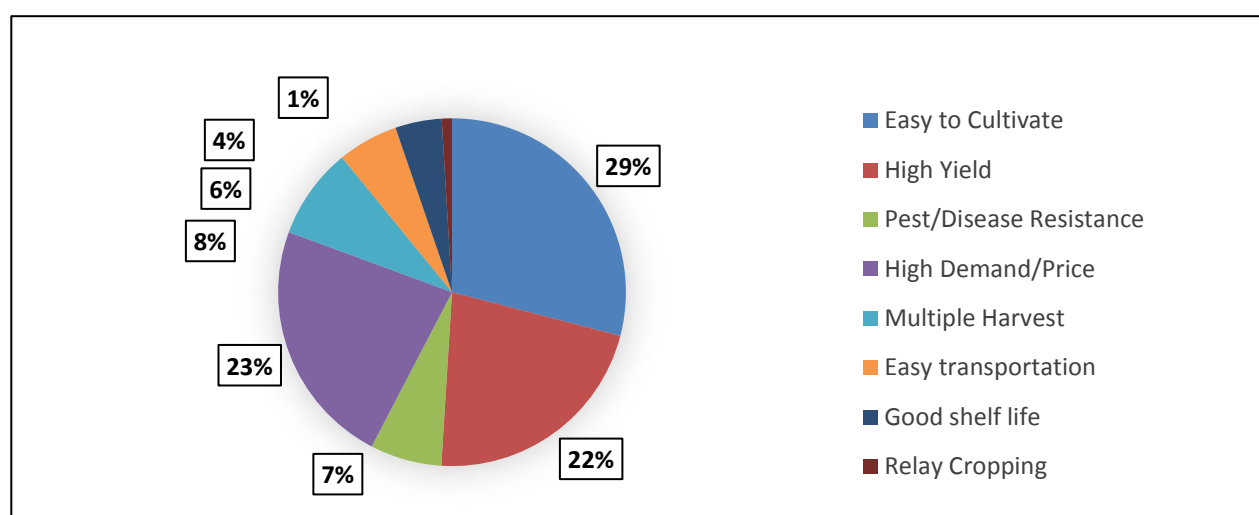


Figure 1-34: Reason for selecting suitable vegetables by farmers (%)

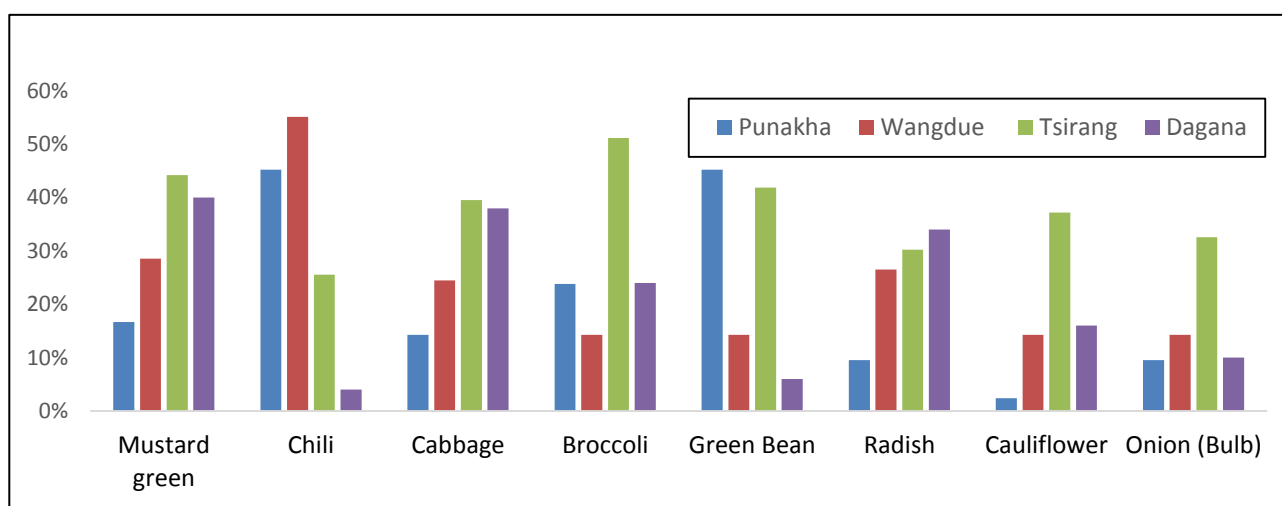


Figure 1-35: Top 8 suitable vegetable chose by farmers in different Dzongkhags (%)

1.7.2.6 Interested New Vegetable Crops

Out of 184 farmers, 95% of them were interested (sought) on new vegetable crops in addition to the crops they have cultivated for more income (some were just for their liking). However, more than half (62%) of them had no idea of on choice of new crop. The order of the reasons of interested new vegetable choice were same as their consideration of suitable vegetable that Easy for Cultivation (24%) followed by High Demand/Price (24%) then High Yield (21%). Tsirang had most high ratio of “Yes but no idea” that was seemed because they have cultivated variety of vegetable crops already, however, they had specific interest on Chili and Mushroom. Punakha and Dagana had approximately even distribution. Asparagus came on top in Wangdue. Also, there were some industrial crops (Turmeric, Ginger, Garlic) had listed as interested crop.

Table 1-26: Interested New Vegetable Crops and Reason

Crop	Total	Reason								
		Easy to Cultivate	High Yield	Pest/ Disease Resi.	High Demand/ Price	Multiple Harvest	Easy Transportation	Good shelf life	Relay Cropping	Others
Asparagus	13	8	9	3	9	4	0	1	0	0
Tomato	10	4	7	0	7	2	1	0	1	0
Mustard green	8	6	2	2	0	5	0	0	0	0
Onion (Bulb)	8	3	5	3	6	0	0	4	1	0
Broccoli	7	2	2	1	5	3	0	0	0	0
Other (Mushroom)	7	2	3	0	2	0	0	0	0	3
Cabbage	5	3	3	0	3	0	0	0	0	0
Carrot	5	3	3	2	2	0	2	1	0	0
Chili	5	3	3	1	2	5	1	0	0	0
Cauliflower	4	2	2	0	3	1	0	0	0	0
Pea	4	3	2	1	2	1	0	0	0	0

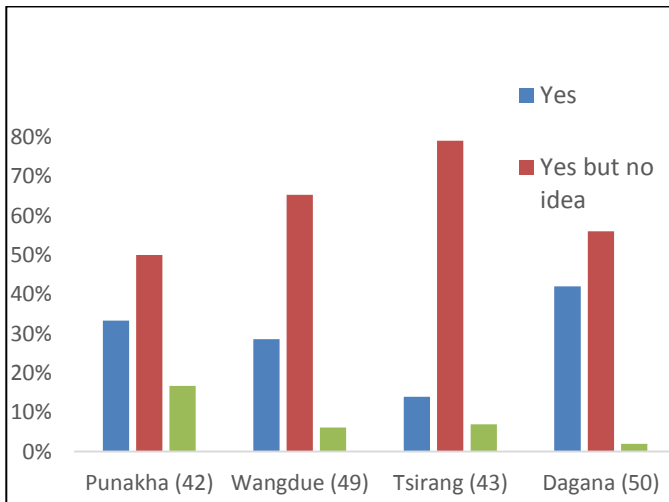


Figure 1-36: Farmers interest on new vegetable in Dzongkhag

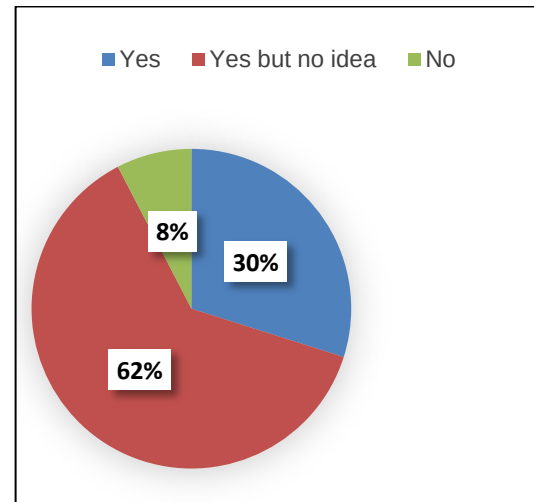


Figure 1-37: Percent of farmers for new vegetable crops

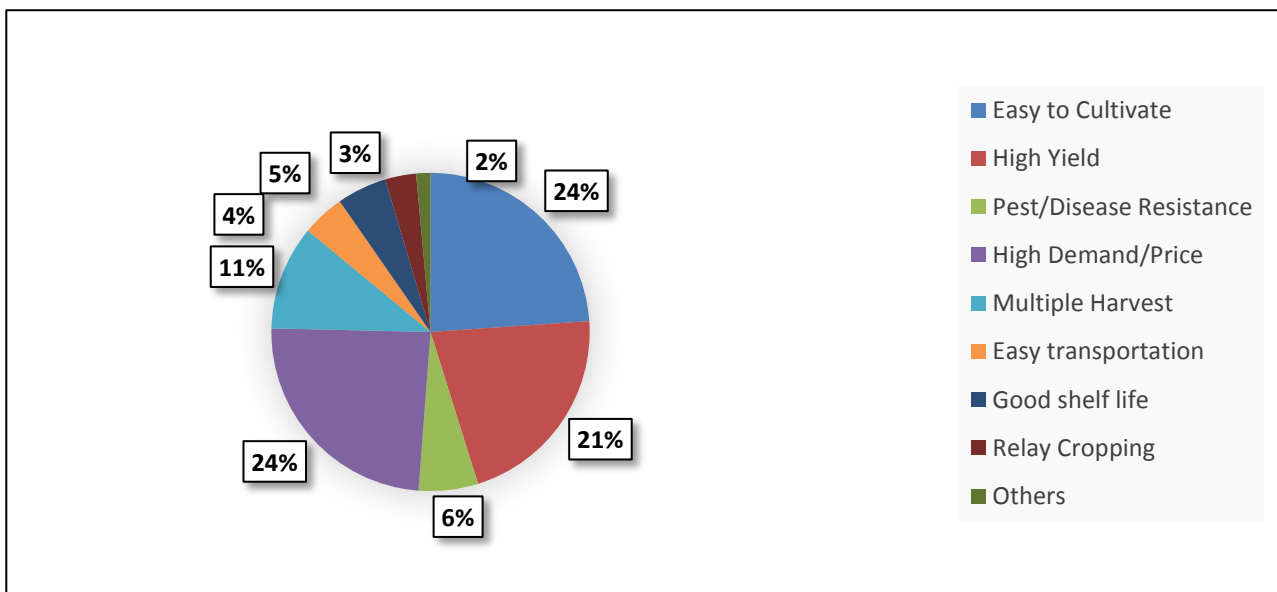


Figure 1-38: The farmers' reasons for their preference to new vegetable crops

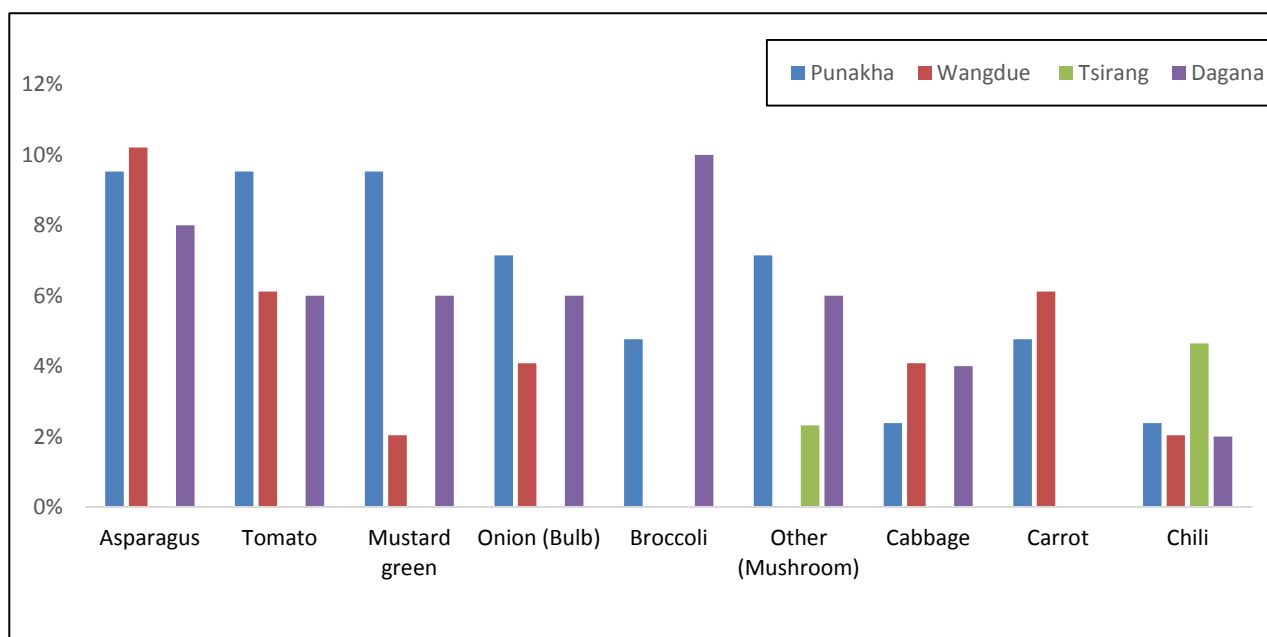


Figure 1-39: Top 9 interested vegetable of farmers in different Dzongkhag

1.7.2.7 Problems/Constraints on Vegetable cultivation

Out of 184 farmers, 98% of them expressed to have Problems/Constraints with regard to Vegetable cultivation. The top three problems were; Water shortage (67%), Pest/Disease (54%), Wild Animal (48%).

Table 1-27: Problems/Constraints in Vegetable cultivation

	Total	Most Serious	Serious	Least Serious	%
Water shortage	123	88	26	9	67%
Pest/Disease	99	29	40	30	54%
Wild Animal	89	40	33	16	48%
Man power	85	34	33	18	46%
Knowledge/Skill	39	11	18	10	21%
Market Access	34	13	10	11	18%
Seed/seedling availability	34	5	19	10	18%
Poor Soil Fertility	19	2	8	9	10%
Other	16	5	7	4	9%
Poor Seed/Seedling	16	3	5	8	9%
Low Market Price	15	5	7	3	8%
Natural Disaster	9	3	2	4	5%
Persistent Weeds	8	4	3	1	4%
Limited Fund	7	3	0	4	4%
Limited Land	1	1	0	0	1%

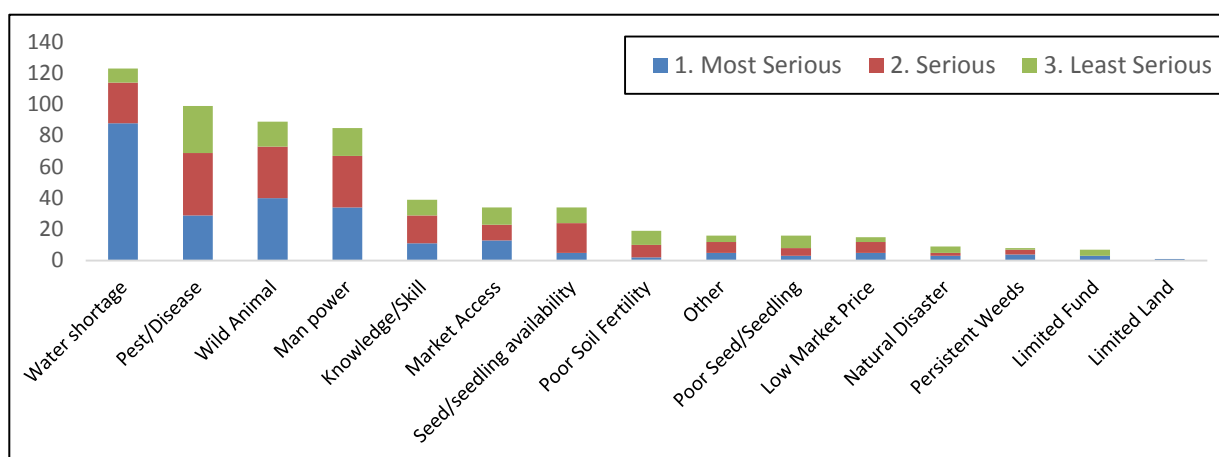


Figure 1-40: Problem and its seriousness in vegetable cultivation

Water shortage and Pest/Disease, Wild Animal and Manpower shortage rank were not found much difference in mid and high altitude zone for vegetable cultivation.

Table 1-28: Problems/Constraints in Vegetable cultivation in MASL

	<1000m (n48)		1001~1600m (n84)		>1601m (n52)	
	Total	%	Total	%	Total	%
Water shortage	37	76%	50	61%	32	58%
Pest/Disease	28	57%	45	55%	26	47%
Wild Animal	17	35%	37	45%	32	58%
Man power	19	39%	40	49%	27	49%
Knowledge/Skill	12	24%	16	20%	11	20%
Market Access	11	22%	17	21%	6	11%
Seed/seedling availability	9	18%	13	16%	11	20%
Poor Soil Fertility	6	12%	4	5%	9	16%
Low Market Price	5	10%	6	7%	7	13%
Poor Seed/Seedling	4	8%	6	7%	7	13%
Other	2	4%	10	12%	3	5%
Natural Disaster	1	2%	7	9%	1	2%
Limited Fund	3	6%	1	1%	3	5%
Persistent Weeds	0	0%	6	7%	1	2%
Limited Land	0	0%	1	1%	0	0%

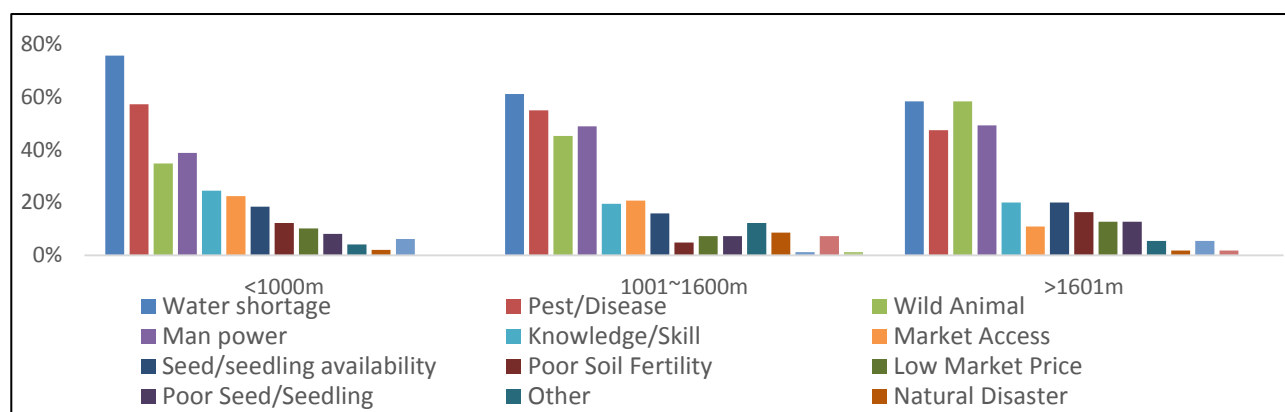


Figure 1-41: Problems in vegetable cultivation in MASL (%)

1.7.3 Industrial Crop

1.7.3.1 Industrial Crop Cultivation

Out of 7 Industrial crops listed, 4 crops were cultivated in a total of 89.3 acres (Wet land 3.9 acres, Dry land 85.4 acres). The most common industrial crops cultivated were Cardamom (48.7 acres) and Garlic (35.5 acres). In terms of number of farmers involved, Garlic had maximum number 83 (45%) followed by Cardamom 70 (38%) and Ginger 69 (38%). Dzongkhag wise, most of industrial crops were cultivated in Tsirang and Dagana popularly in lower altitude range.

Table 1-29: Industrial crop, number of farmers and their land area (acre)

Crop	Punakha (n42)			Wangdue (n49)			Tsirang (n43)			Dagana (n50)		
	Cul. No.	Wet Land	Dry Land	Cul. No.	Wet Land	Dry Land	Cul. No.	Wet Land	Dry Land	Cul. No.	Wet Land	Dry Land
Garlic	12	0.33	0.92	13	0.01	0.50	33	2.00	31.00	25	0.04	0.74
Ginger	4	0.05	0.68	7	0.01	0.10	31	0.08	3.27	27	0.00	0.65
Cardamom							36	1.40	22.76	34	0.00	24.51
Turmeric							4	0.00	0.20	3	0.00	0.04
Oyster Mushroom												
Shitake Mushroom												
Other												

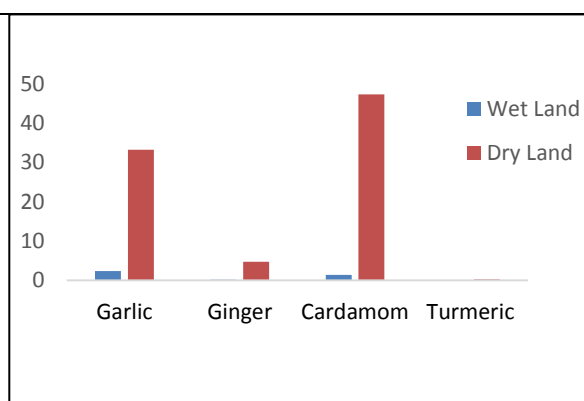


Figure 1-42: Land area (acre) under industrial crop

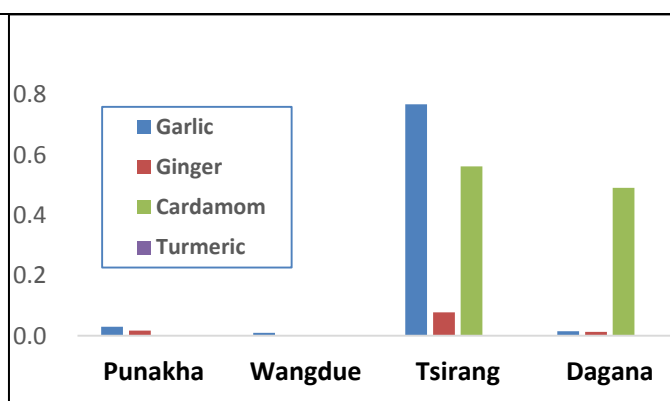


Figure 1-43: Average land area (acre) under industrial crop in different Dzongkhags

Table 1-30: Industrial Crop Cultivation by MASL (Farmers No. and Land area)

	<1000m (n48)			1001~1600m (n84)			>1600m (n52)			Total Cul. No.	Total Ave. (Acre)
	Cul. No.	Total. (Acre)	Ave. (Acre)	Cul. No.	Total. (Acre)	Ave. (Acre)	Cul. No.	Total. (Acre)	Ave. (Acre)		
Garlic	35	16.32	0.47	32	17.09	0.53	16	0.37	0.02	83	0.43
Ginger	38	3.06	0.08	29	0.93	0.03	2	0.01	0.01	69	0.07
Cardamom	31	21.58	0.70	34	25.59	0.75	5	1.5	0.30	70	0.70
Turmeric	4	0.2	0.05	2	0.03	0.02	1	0.01	0.01	7	0.03

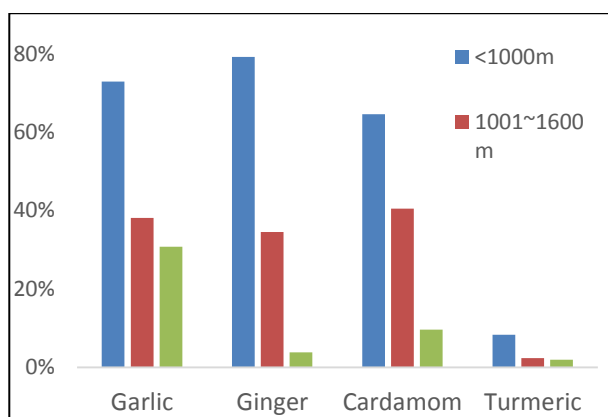


Figure 1-44: Farmers cultivating industrial crop by MASL(%)

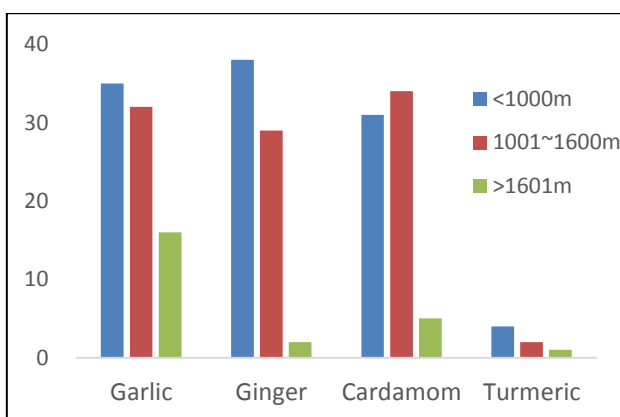


Figure 1-45: Area (acre) under industrial crop by MASL

1.7.3.2 Industrial Crop Production

There was huge difference on average production of Ginger and Cardamom. In Tsirang, Ginger was cultivated in an area 3.35 acre and the production was 3,653kg (1,085kg/ac) while it was 0.73 acre and 262kg (359kg/ac) in Punakha, 0.65 acre and 1,072kg (1,649kg/ac) in Dagana, 0.11 acre and 100kg (909kg/ac) in Wangdue. In case of Cardamom, it was cultivated in larger area than Ginger. In Tsirang, land area under Cardamom was 24.16 acre and production was 927kg (38kg/ac) while same was 24.51 acre and 2,423kg (99kg/ac). There seems to be many new farmers who have taken up new cultivation of Cardamom. The ratio of farmers marketing was 56% in Tsirang and 44% in Dagana. Huge production gap was also found for Cardamom. Besides, inaccurate information and/or recording that unknown to them, the age of the plant, soil fertility, crop management could be the like causes of these huge gap.

Table 1-31: Industrial crop production

	Total (kg)		Punakha (n42)		Wangdue(n49)		Tsirang (n43)		Dagana (n50)	
	Total	*CF Ave.	Total	*CF Ave.	Total	*CF Ave.	Total	*CF Ave.	Total	*CF Ave.
Garlic	1,503	18	459	38	276	21	387	12	381	15
Ginger	5,087	74	262	66	100	14	3,653	118	1,072	40
Cardamom	3,350	48					927	26	2,423	71
Turmeric	60	9					35	9	25	8
CF: Cultivated Farmer										

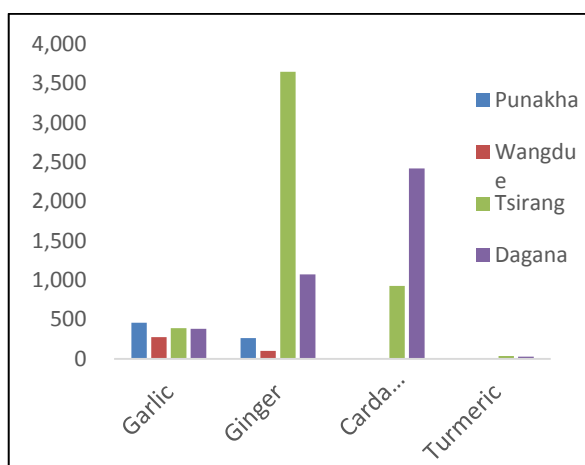


Figure 1-46: Industrial crop production in Dzongkhag (kg)

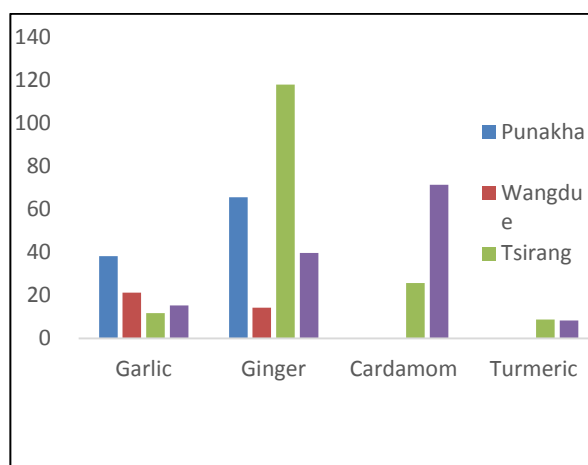


Figure 1-47: Average production (kg) of industrial crops cultivated by farmers

1.7.2.3 Industrial Crop Marketing and Income

Marketing ratio of Industrial Crop were, Cardamom 50%, Garlic 43% Ginger 41% and Turmeric 14%. Cardamom and Turmeric were cultivated mainly for export. The lower marketing ratio of Cardamom and Turmeric could be due to new plantation and yet to harvest. Garlic and Giger ware because of home consumption. As per market share, Garlic and Ginger were mostly sold in Town/Weekend market while Cardamom and Turmeric were mostly sold to Buyer/Vender and only a few farmers sold to Auction yard/FCB. This low volume sale in auction yard could be related to less product and lack of mobility or accessibility. Cardamom, the highest priced among the industrial crops, was the largest income source for farmers in Tsirang and Dagana. The price range of Cardamom was Nu. 700~1,850/Kg, on average of Nu. 1,250/Kg.

Table 1-32: Industrial Crop Marketing Farmers (No.), Market and Income (Nu)

	Marketing Farmer	Income (Nu)		Market						
		Total	*MF Ave.	Neighbour	Road-side Market	Town/Market	Big City	Buyer/Vendor	Projects	Auction yard/FCB
Garlic	36	59,885	1,663	200	10	6	5	20	1	3
Ginger	28	103,504	3,697	200	15	5	2	11	3	5
Cardamom	35	3,598,200	102,806	1,825	700	1	0	5	5	23
Turmeric	1	20,250	20,250	1,350	1,150	0	0	0	0	1
* Marketing farmer's average income										

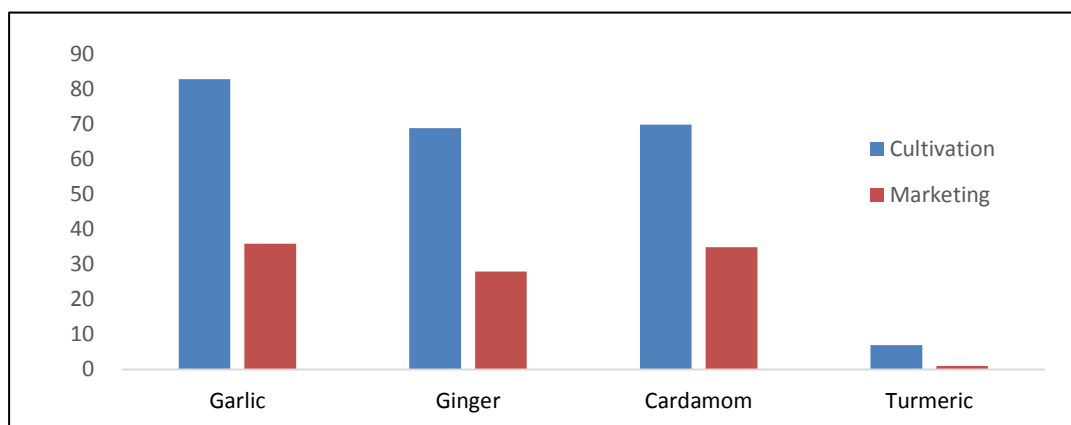


Figure 1-48: Number of farmers cultivating and marketing industrial crops

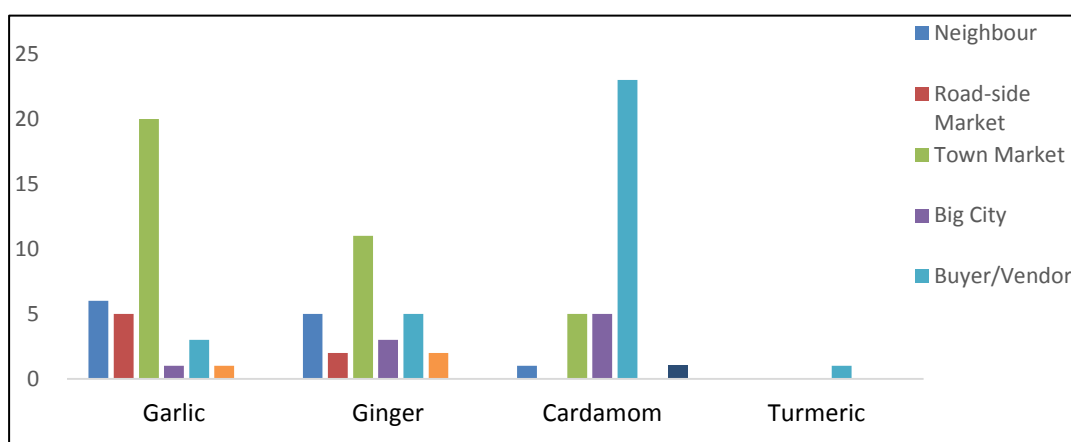


Figure 1-49: Market types (Number) used by farmers for industrial crops

1.7.4 Fruit and Nut

1.7.4.1 Fruit and Nut Cultivation

A total of 30 listed Fruit/Nut were cultivated in four Dzongkhag and the total number of 12,358 fruit trees were recorded. The most cultivated fruit were Mandarin (64%) followed by Peach (53%), Banana and Pear (47%). In terms of number of trees, Mandarin (11,204) was top followed by Hazelnut (6,178) and Banana (2,645). Dzongkhag wise, Dagana had highest number of fruit and nut trees (total 12,358). Tsirang ranked second (6,871) followed by Punakha (3,650) and Wangdue (2,482). The huge difference in number of trees was mainly due to Mandarin (largely cultivated in Tsirang and Dagana) and Banana (cultivated only in minute quantities).

Table 1-33: Farmers Cultivating Top 20 Fruit and Nut, and Nos. of Tree

Crop	Punakha (n42)		Wangdue (n49)		Tsirang (n43)		Dagana (n50)		Total (n184)	
	Cul. Farmer	Tree No.	Cul. Farmer	Tree No.	Cul. Farmer	Tree No.	Cul. Farmer	Tree No.	Cul. Farmer	Tree No.
Mandarin	19	843	28	940	33	3,255	37	6,166	117	11,204
Peach	25	129	23	58	20	52	30	148	98	387
Banana	7	29	17	130	31	1,977	31	509	86	2,645
Pear	22	134	26	192	15	28	23	108	86	462
Guava	15	130	13	63	16	77	29	260	73	530
Mango	8	34	6	41	21	186	28	368	63	629
Pomegranate	10	37	9	35	19	73	15	79	53	224
Plum	7	23	7	17	14	34	18	37	46	111
Avocado	14	149	7	70	11	87	11	69	43	375
Soft Shell walnut	11	143	13	248	11	42	7	21	42	454
Persimmon	13	39	19	64	3	5	1	2	36	110
Passion Fruit	4	12	8	17	7	14	9	14	28	57
Lime / Lemon	5	76	2	6	13	70	6	16	26	168
Litchi					14	91	10	72	24	163
Hard Shell walnut	8	146	3	7	7	24	4	33	22	210
Papaya	1	1			13	82	8	19	22	102
Hazelnut	6	1,714	7	291	1	250	6	3,923	20	6,178
Apple	1	1	7	218	3	8	7	123	18	350
Pine Apple			4	15	9	100	4	78	17	193

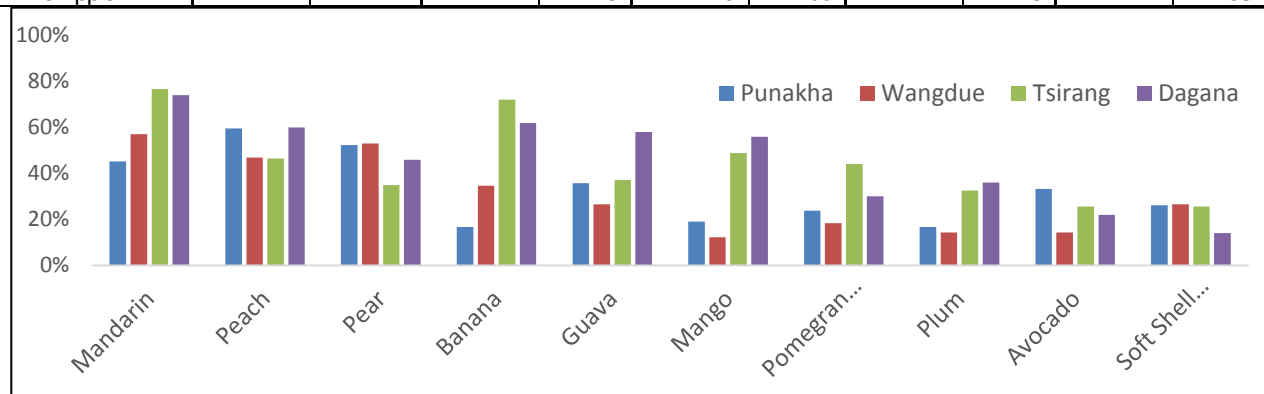


Figure 1-50: Percentage of farmers cultivating top 10 fruits/nuts

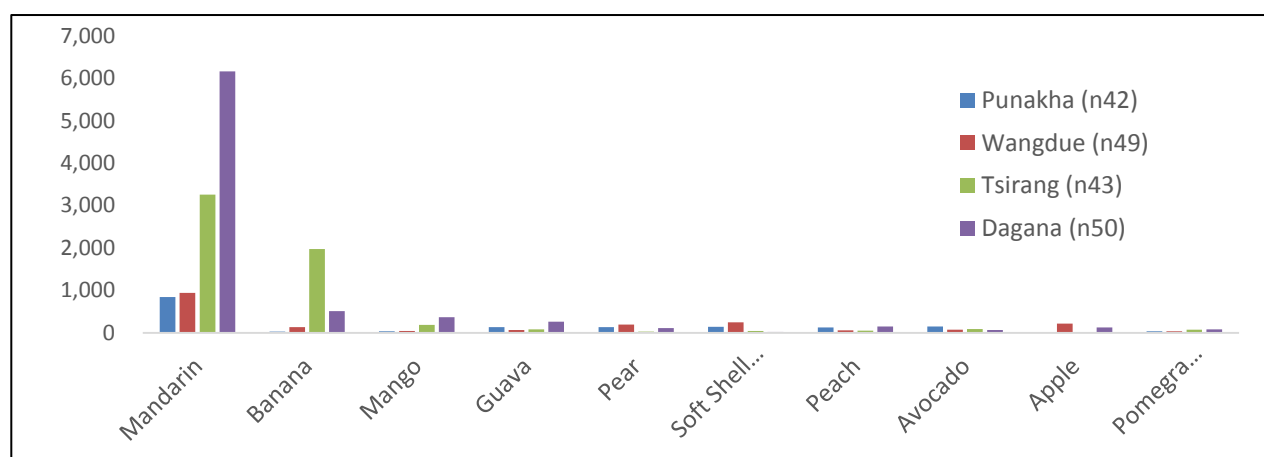


Figure 1-51: Top 10 cultivated fruits and nuts tree (No) except hazelnut and other

Mandarin and Banana were mostly cultivated in low to mid altitude range, whereas Hazelnut was mostly found cultivated in high altitude. Except for these top three crops, Mango and Sugarcane were dominant in low altitude area. Guava was mostly cultivated in mid-range altitude while Pear, Walnut and Apple were found mostly in high altitude. However, Avocado which is considered as a sub-tropical fruit was found mostly in mid to high altitude areas.

Table 1-34: Top 20 Fruit and Nut Cultivation by MASL (Farmer and Tree No.)

	<1000m (n48)			1001~1600m (n84)			>1600m (n52)		
	Cul. Farmer	Tree Nos	Ave. Tree No.	Cul. Farmer	Tree Nos	Ave. Tree No.	Cul. Farmer	Tree Nos	Ave. Tree No.
Mandarin	32	2778	58	61	7926	94	24	500	10
Hazelnut	0	0	0	7	1313	16	13	4865	94
Banana	38	1256	26	40	1355	16	8	34	1
Mango	34	501	10	26	118	1	3	10	0
Pear	15	33	1	39	177	2	32	252	5
Soft Shell walnut	4	13	0	22	89	1	16	352	7
Guava	31	81	2	36	303	4	6	19	0
Peach	27	60	1	43	201	2	28	126	2
Avocado	11	44	1	20	188	2	12	143	3
Other (sugarcane)	2	240	5	2	130	2	0	0	0
Apple	0	0	0	7	26	0	11	324	6
Pomegranate	23	85	2	21	111	1	9	28	1
Hard Shell walnut	2	2	0	13	71	1	7	137	3
Pine Apple	13	180	4	4	13	0	0	0	0
Lime / Lemon	11	24	1	12	78	1	3	66	1
Litchi	15	128	3	8	33	0	1	2	0
Plum	9	22	0	28	67	1	9	22	0
Persimmon	1	2	0	19	52	1	16	56	1
Papaya	15	86	2	7	16	0	0	0	0
Kiwi	0	0	0	4	34	0	3	55	1

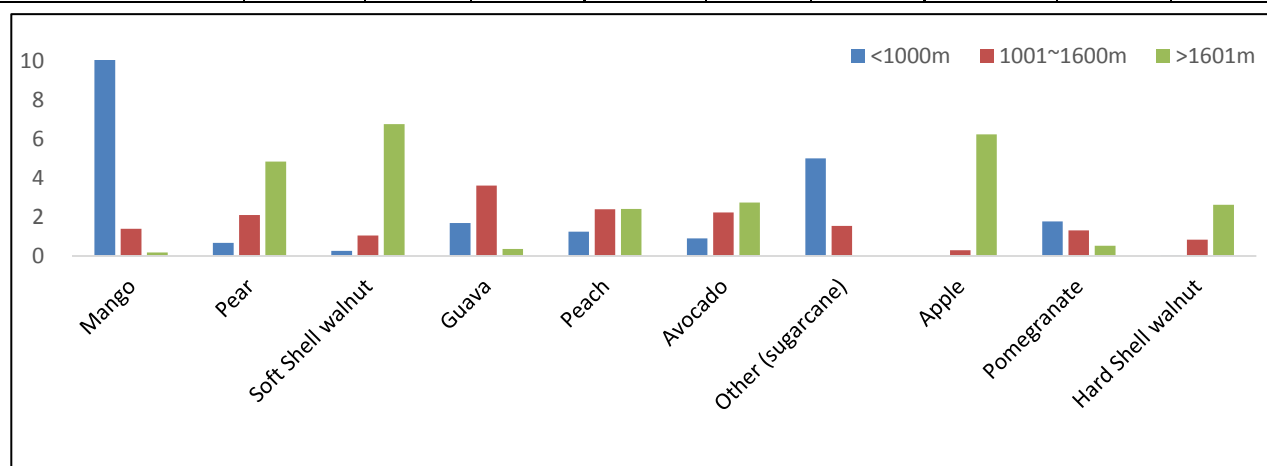


Figure 1-52: Top 10 cultivated fruits and nuts in MASL (Average tree number) except mandarin, hazelnut, banana

1.7.4.2 Fruit and Nut Seed/Seedling

Out of 184 respondents, 110 farmers received seed/seedling. Main Source of Fruit and Nut Seed/Seedling were from Dzongkhag (DAO-57%) in free of cost. The purchase from NSC/Commission Agent was 16%, while Private Enterprise had supplied about 10% of the respondents. ARDC Bajo supply accounted to only

8% of the total supply. Of those who received seeds and seedling, 84% of them were satisfied with quality of the seed/seedling. Only 5% (12 farmers) were not-satisfied and their majority reason was poor quality (92%).

Table 1-35: Top 17 Fruit and Nut Seed/Seedling Source and Quality Evaluation

Yes: 110 No: 74	DAO	ARDC	NSC/ Com. Agent	Private Enterprise	Seedling Grower	Neighbor	Other	Quality Evaluation			
								N.A.	Satisfied	Neutral	Not Satisfied
Mango	22	0	8	2	2	0	0	0	25	8	1
Other	15	0	4	5	0	4	1	0	28	1	0
Pear	19	7	2	0	0	0	0	0	27	0	1
Avocado	10	6	0	2	5	0	0	0	20	1	2
Peach	18	1	1	2	0	0	1	0	21	1	1
Mandarin	14	0	6	1	0	1	0	0	17	4	1
Litchi	12	0	3	2	1	0	0	1	12	3	2
Pomegranate	8	3	3	0	0	0	0	0	11	1	2
Guava	5	0	2	2	0	0	0	0	7	1	0
Soft Shell walnut	4	1	3	0	1	0	0	0	7	2	0
Apple	5	0	1	1	1	0	0	0	6	1	1
Plum	4	0	0	2	0	1	0	0	6	1	0
Hazelnut	0	0	0	6	0	0	0	1	4	1	0
Persimmon	2	1	1	0	0	0	1	0	6	0	0
Apricot	3	0	1	0	0	0	0	0	3	1	0
Kivi	1	1	0	2	0	0	0	0	4	0	0
Passion Fruit	4	0	0	0	0	0	0	0	4	0	0

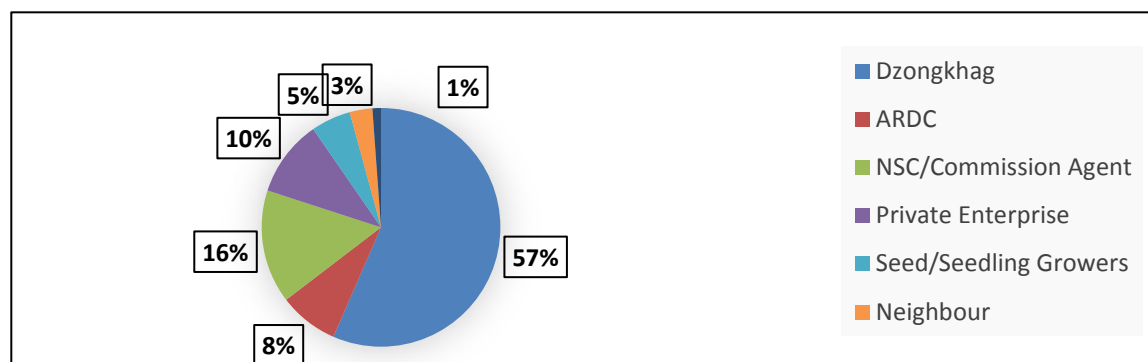


Figure 1-53: Fruits and nuts seeds and seedlings source (%)

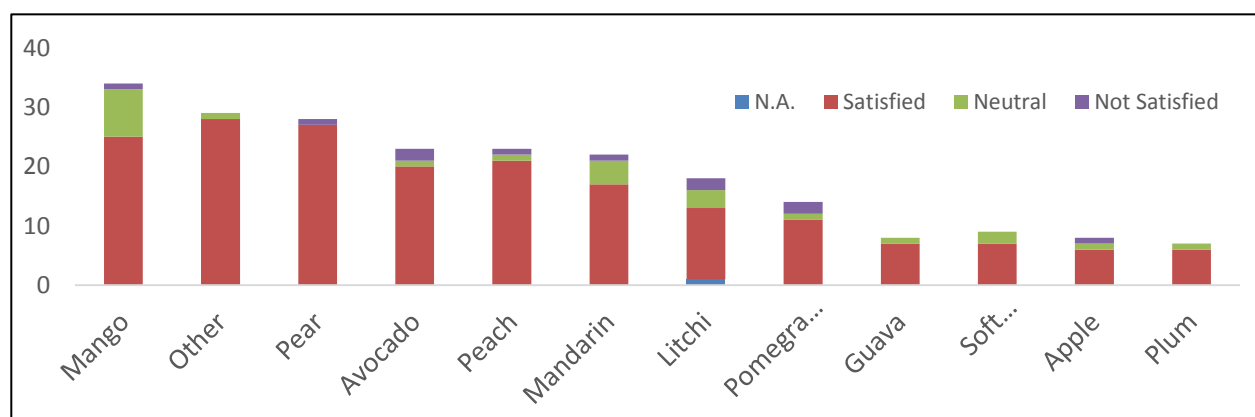


Figure 1-54: Top 12 fruits and nuts seeds and seedling quality evaluation in Number

Only 8 Farmers (4%) had sell Fruit and Nut Seed/seedling. The seed/seedling were mostly sold a few numbers at village/neighbor (67%) and only 4% to Dzongkhag/Gewog agriculture office.

Table 1-36: Market for Fruit and Nut Seed and Seedling

Total	In village/ Neighbors	Road side market	Dzongkhag/ Gewog	Total
Avocado			1	1
Chestnut			1	1
Jack Fruit	1			1
Litchi			1	1
Mandarin (Orange)	1			1
Mango			1	1
Plum	1			1
Pomegranate	1			1
Passion Fruit	1			1
Other	3			3

1.7.4.3 Fruit/Nut Variety and Bearing Age

Except avocado, most of Fruits/Nuts cultivated were local variety. Many respondents considered seedling received from DAO or other source as "Improved variety". However, most of them were not aware of the name of variety. Their response to the variety whether "Improved/Local" was either "mixed" or "not sure".

Table 1-37: Top 15 Fruit/Nut Variety (Except Hazelnut and Banana)

	Total Tree No.	Variety		
		Improved	Local	Improved/Local
Mandarin	11,204	7	88	22
Mango	629	19	28	13
Guava	530	4	58	9
Pear	461	22	48	14
Peach	387	25	55	14
Avocado	375	25	6	11
Apple	350	5	1	11
Pomegranate	224	5	37	8
Pine Apple	178	0	10	3
Lime / Lemon	168	3	18	4
Litchi	163	4	12	7
Papaya	150	2	19	5
Plum	111	5	34	4
Persimmon	90	2	32	1
Kiwi	89	2	2	3
Chestnut	73	1	2	2
Strawberry	70	1	1	2
Pecan nut	59	1	0	1
Passion Fruit	57	1	22	5
Areca Nut	43	0	8	2

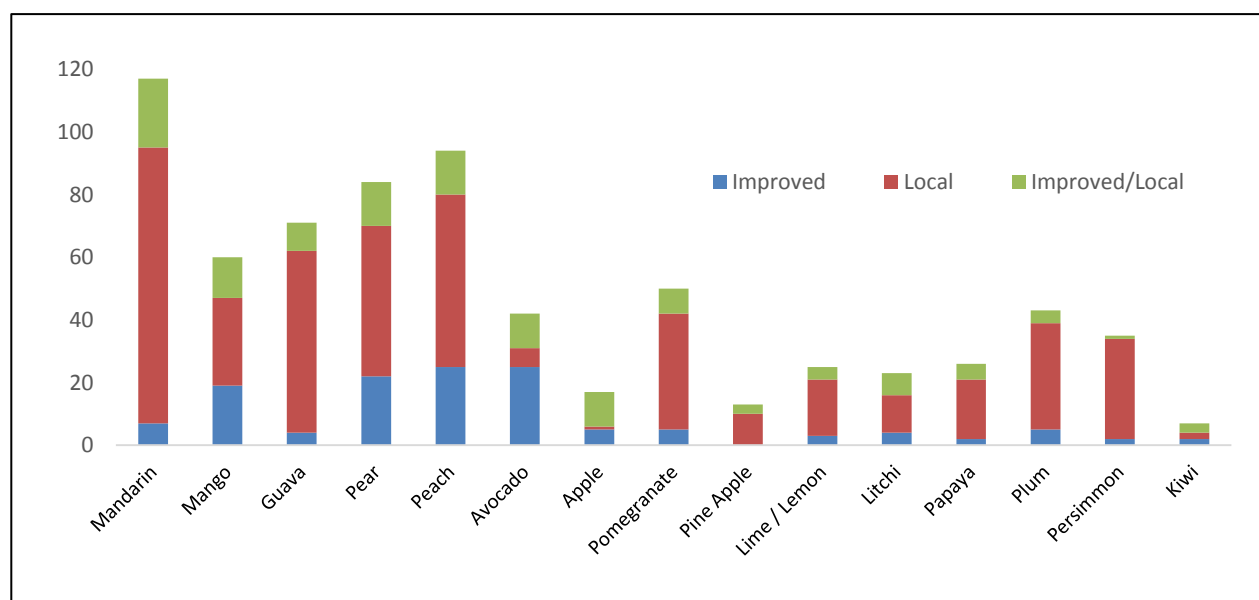


Figure 1-55: Number of farmers cultivating top 15 cultivated fruits and nuts variety (Except hazelnut, banana and walnut)

Many farmers were not sure of tree age and tree age of its first bearing except for the recently planted trees. In general, average tree age for Mandarin was 20 years (by excluding oldest 200 years, average 19 years), Pear and Persimmon was 11 years, Plum 9 was years and Avocado was 4 years. The average tree age showed history of Fruit/Nut cultivation in the area.

Table 1-38: Number of Trees for Top 20 Fruit/Nut, Tree Age and Bearing status

(Except Hazelnut, Banana, Pine Apple, Strawberry)

	Bearing				Non-Bearing			
	Tree Nos	Youngest (Year)	Oldest (year)	Ave. Age	Tree Nos	Youngest (Year)	Oldest (year)	Ave. Age
Mandarin	6,810	1.0	200.0	19.9	4,394	1.0	10.0	3.6
Mango	146	2.0	50.0	9.1	483	1.0	15.0	3.0
Guava	404	1.0	30.0	6.5	126	1.0	7.0	2.1
Pear	153	1.0	70.0	10.7	308	1.0	7.0	2.1
Peach	162	1.0	22.0	6.4	225	1.0	8.0	2.2
Avocado	4	5.0	20.0	4.3	371	1.0	10.0	2.2
Apple	255	3.0	20.0	5.5	95	1.0	6.0	2.6
Pomegranate	97	1.0	25.0	7.4	127	1.0	12.0	2.3
Lime / Lemon	43	1.0	15.0	7.2	125	1.0	4.0	2.5
Litchi	15	1.0	10.0	5.6	148	1.0	6.0	2.2
Papaya	75	1.0	10.0	3.9	75	1.0	5.0	1.4
Plum	67	3.0	30.0	8.5	44	1.0	4.0	1.7
Persimmon	64	2.0	50.0	11.1	26	1.0	6.0	2.5
Kiwi	6	4.0	10.0	7.7	83	1.0	2.0	1.1
Chestnut	3	4.0	8.0	3.6	70	1.0	6.0	2.4
Pecan nut	6	1.0	15.0	6.0	53	1.0	8.0	3.8
Passion Fruit	44	1.0	7.0	2.5	13	1.0	3.0	1.3
Areca Nut	8	10.0	12.0	11.0	35	0.5	15.0	3.8
Jack Fruit	14	4.0	50.0	17.1	26	1.0	10.0	4.3
Apricot	8	2.0	6.0	3.8	17	1.0	4.0	1.9

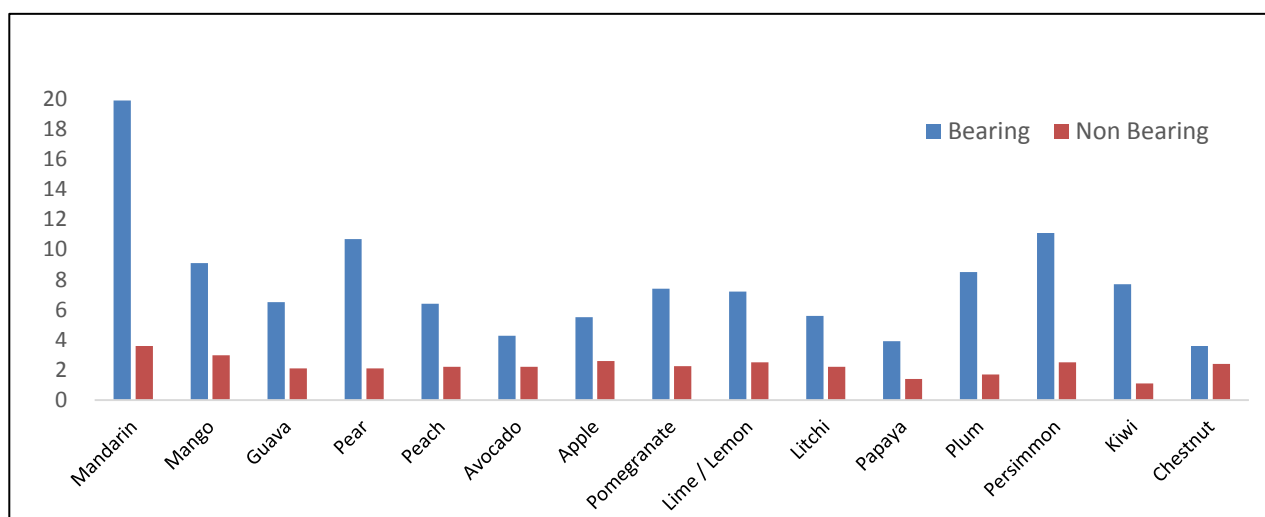


Figure 1-56: Average bearing age (year) of top 15 cultivated fruits and nuts (Except Hazelnut, banana, Pineapple)

1.7.4.4 Fruit and Nut Production

The farmers generally tend to give lower figure on production and income. Also, a few who didn't sell their product couldn't give production figure. Mandarin had highest production which is then followed by Banana and Pear. Dzongkhag wise, Mandarin was mostly produced in Dagana and Tsirang whereas Banana was found only in Tsirang, Guava and Passion Fruit were found in Punakha. Similarly, Jack Fruit and Papaya was found in Tsirang and Dagana whereas Persimmon was found restricted in Punakha and Wangdue

Table 1-39: Top 20 fruit and nut production (kg)

	Total (kg)		Punakha (n42)		Wangdue(n49)		Tsirang (n43)		Dagana (n50)	
	Total	*HF Ave.	Total	*HF Ave.	Total	*HF Ave.	Total	*HF Ave.	Total	*HF Ave.
Mandarin	191,404	1,636	11,149	697	12,317	560	53,900	3,171	114,038	4,224
Banana	26,694	310	387	77	791	47	20,592	858	4,924	170
Pear	17,857	208	6,339	453	2,380	149	5,675	473	3,463	231
Peach	9,567	98	2,279	127	1,979	110	2,290	121	3,019	135
Guava	8,425	115	4,590	353	591	66	73	5	3,171	132
Plum	8,387	182	895	179	740	185	2,150	179	4,602	384
Passion Fruit	6,631	237	6,160	1,540	110	18	225	32	136	23
Persimmon	5,914	164	3,401	486	2,513	157				
Mango	5,237	83	250	50	660	165	500	63	3,827	273
Jack Fruit	2,709	169					300	300	2,409	301
Lime / Lemon	1,411	54	76	59	43	22	332	33	960	240
Papaya	1,352	61					958	87	394	56
Apple	1,137	63	10	10	1,097	219	28	9	2	2
Pomegranate	807	15	88	13	216	36	238	20	265	22
Hard Shell walnut	607	28	90	30	303	152	14	5	200	200
Chestnut	334	56	333	333					1	1
Areca Nut	215	20					200	200	15	15
Pine Apple	214	13			132	33	75	11	7	4
Soft Shell walnut	184	4	48	16	131	19	5	5		
Pumelo	136	12	2	2	81	27	50	50	3	3

*HF: Harvested Farmer

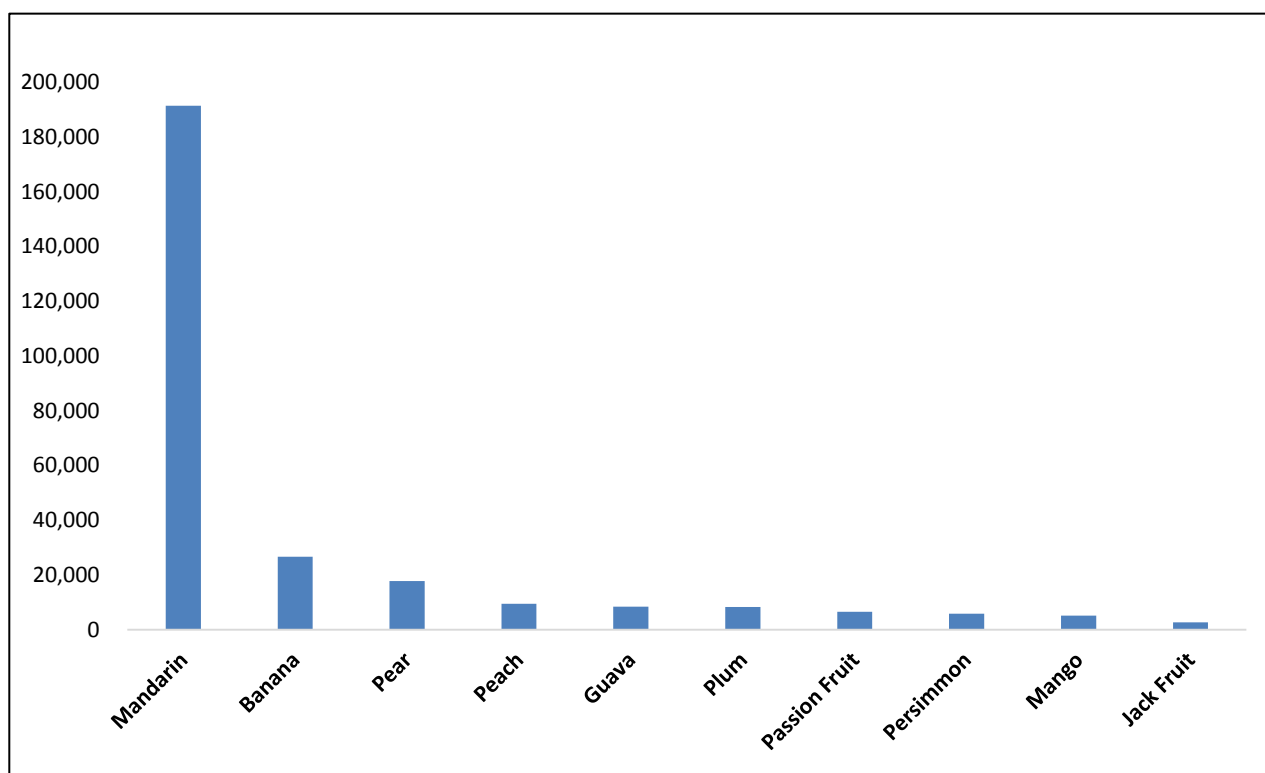


Figure 1-57: Top 10 fruit and nut production (kg)

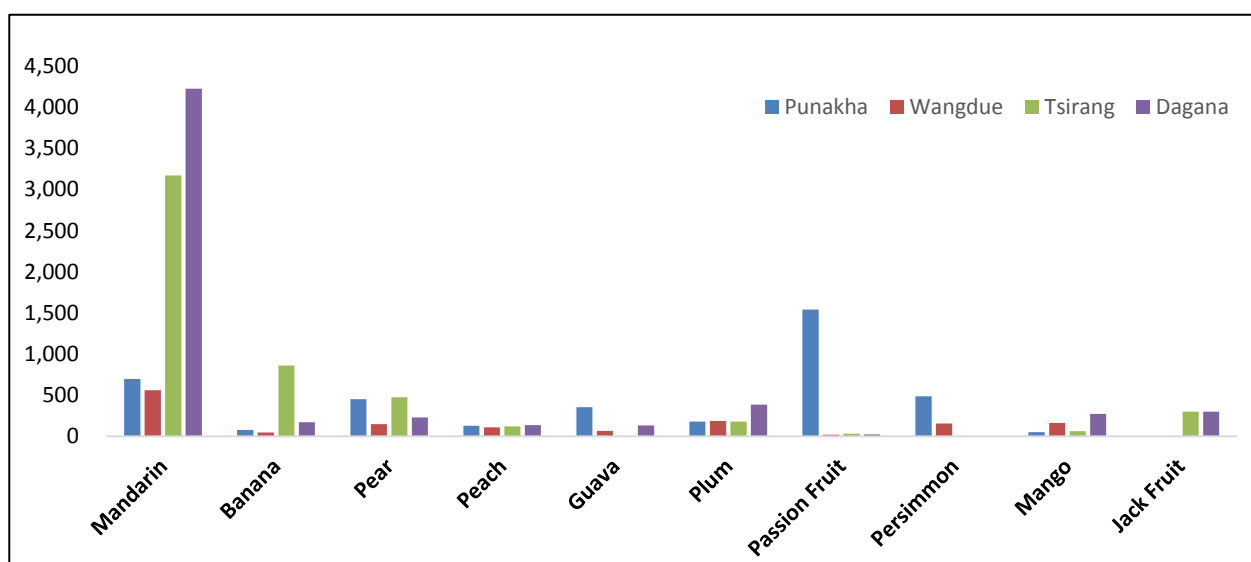


Figure 1-58: Average production (kg) of top 10 fruits and nuts

Unexpectedly farmers in mid-altitude had higher volume of harvests of Banana, Passion Fruit and Guava. It appeared that farmers in mid-altitude were more active in agriculture as indicated high land utilization and agriculture income. However, further study and evidences are required to support the claim.

Table 1-40: Top 20 Fruit and Nut Production in MASL (Kg)

	<1000m (n48)		1001~1600m (n84)		>1600m (n52)	
	Total	*HF Ave.	Total	*HF Ave.	Total	*HF Ave.
Mandarin	82,103	2,566	86,466	1,417	3,819	159
Banana	5,806	153	20,852	521	253	32
Pear	4,440	296	7,872	202	5,545	173
Peach	2,607	97	5,451	127	1,599	57
Passion Fruit	101	13	6,421	494	109	16
Guava	3,014	97	3,541	98	3,082	514
Plum	502	56	6,838	244	1,045	116
Lime / Lemon	1,191	108	360	30	20	7
Persimmon			5,026	265	888	56
Mango	3,902	115	1,335	51		
Apple			73	10	1,064	97
Papaya	1,192	79	160	23		
Soft Shell walnut	5	1	49	2	130	8
Jack Fruit	1,109	101	1,600	320		
Pine Apple	182	14	32	8		
Pomegranate	555	24	205	10	47	5
Kiwi			25	6		
Litchi	90	6	5	1		
Chestnut			334	84		
Pumelo	50	17	28	9	58	12

*HF: Harvested Farmer

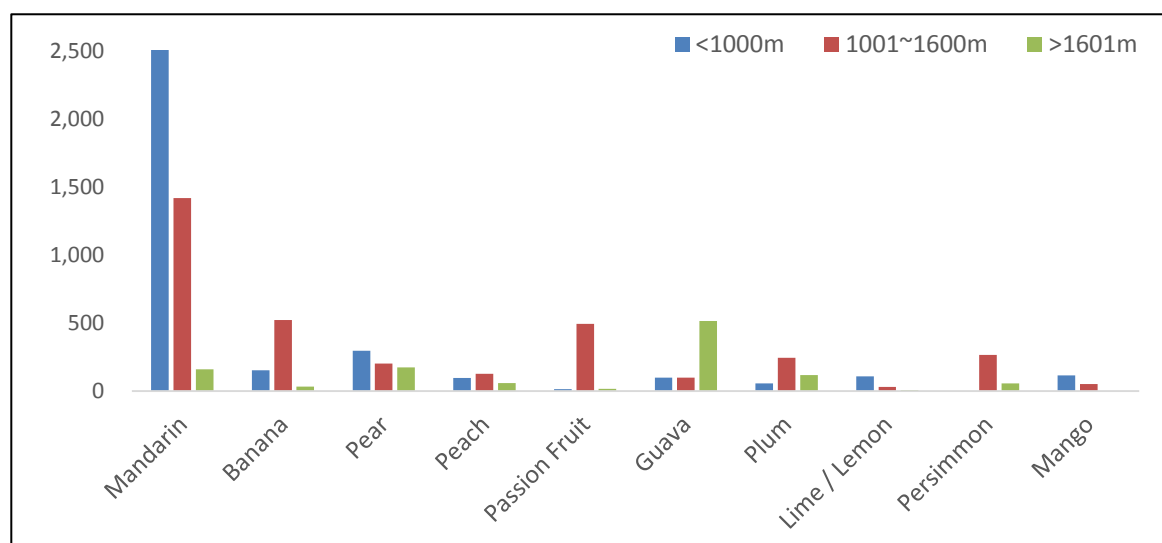


Figure 1-59: Top 10 Fruit and Nut Harvested Farmer Average Production in MASL (Kg)

1.7.4.5 Fruit and Nut Marketing and Income

Numbers of farmers cultivating fruit/Nut, and their marketing ratio was found low in Mandarin 19%, Banana 20%, Pear 12%, and Peach 10%. It may be due to farmer's tendency of hesitation in disclosing their actual income and thereby under estimating their income. And for except Mandarin, their cultivated tree numbers were low. Most of varieties were local with poor quality and low market value. In general, the Market share

for their production was 43% for Town/Weekend Market, 20% for Buyer/Vender (in case of Mandarin 48%), 13% for Road side marker and 11% were for Big City category.

Table 1-41: Farmers Marketing (No.) Top 20 Fruit and Nut and Income (Nu.)

	Mark eting Farmer	Income (Nu)		Market								
		Total	*MF Ave.	Neigh bour	Road -side Mar ket	TownM ar ket	Big City	Buyer /Ven dor	Sch ool	Reli gious Insti.	Proj ects	Auc tion yard/ FCB
Mandarin	22	2,435,850	110,720	0	5	14	6	29	1	0	0	5
Banana	17	337,035	19,826	0	4	5	0	0	1	0	1	0
Pear	10	230,100	23,010	2	2	10	4	0	1	0	1	0
Peach	10	89,900	8,990	1	2	11	5	0	1	0	0	0
Passion Fruit	3	77,000	25,667	0	0	4	0	1	1	0	1	0
Guava	7	56,300	8,043	0	3	6	2	0	0	0	0	0
Plum	6	47,800	7,967	0	1	3	1	3	1	0	0	0
Lime / Lemon	2	28,300	14,150	1	0	2	2	0	0	0	1	0
Persimmon	4	27,600	6,900	0	0	7	0	0	0	0	0	0
Mango	3	26,700	8,900	0	2	3	0	2	0	0	0	0
Apple	1	20,000	20,000	0	0	0	0	1	0	0	0	0
Papaya	8	15,200	1,900	0	3	6	0	1	0	0	0	0
Soft Shell walnut	2	13,500	6,750	0	0	3	0	0	0	0	0	0
Jack Fruit	3	9,200	3,067	0	1	2	0	1	0	0	0	0
Pine Apple	4	3,260	815	1	2	2	0	1	0	0	0	0
Pomegranate	3	3,100	1,033	2	0	2	0	0	0	0	0	0
Kivi	1	3,000	3,000	0	0	0	1	0	0	0	0	0
Litchi	1	2,000	2,000	0	0	0	1	0	0	0	0	0
Chestnut	1	1,500	1,500	0	0	1	0	0	0	0	0	0
Pumelo	1	1,000	1,000	0	0	1	0	0	0	0	0	0

*MF: Marketing Farmer

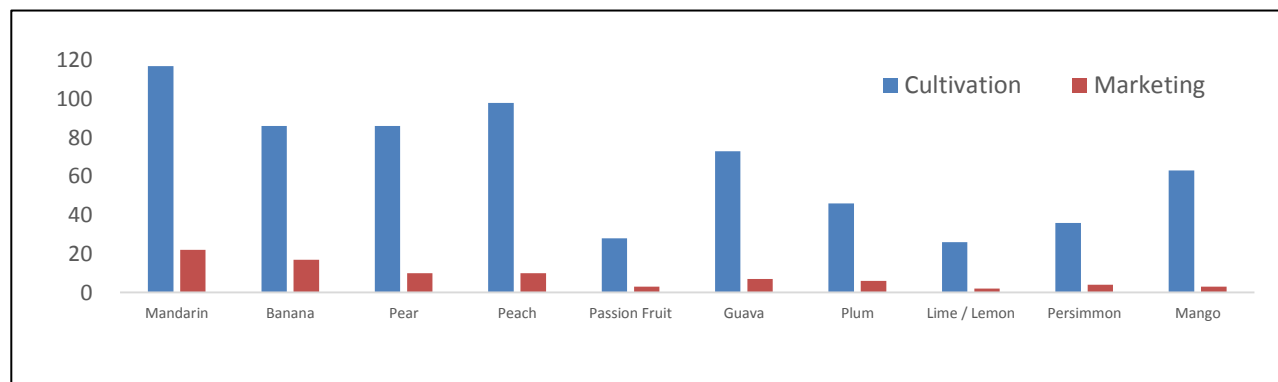


Figure 1-60: Numbers of farmers cultivating and marketing top 10 fruits and nuts

Dzongkhag wise, Big City ratio was relatively high at Punakha (21%) and Dagana (20%) because of accessibility that Punakha to Thimphu, Dagana to Gelephu. Buyer/Vender ratio was high in Dagana (56%) and Tsirang (28%). It seemed because of market access disadvantage and most of Mandarin were produced in these Dzongkhag.

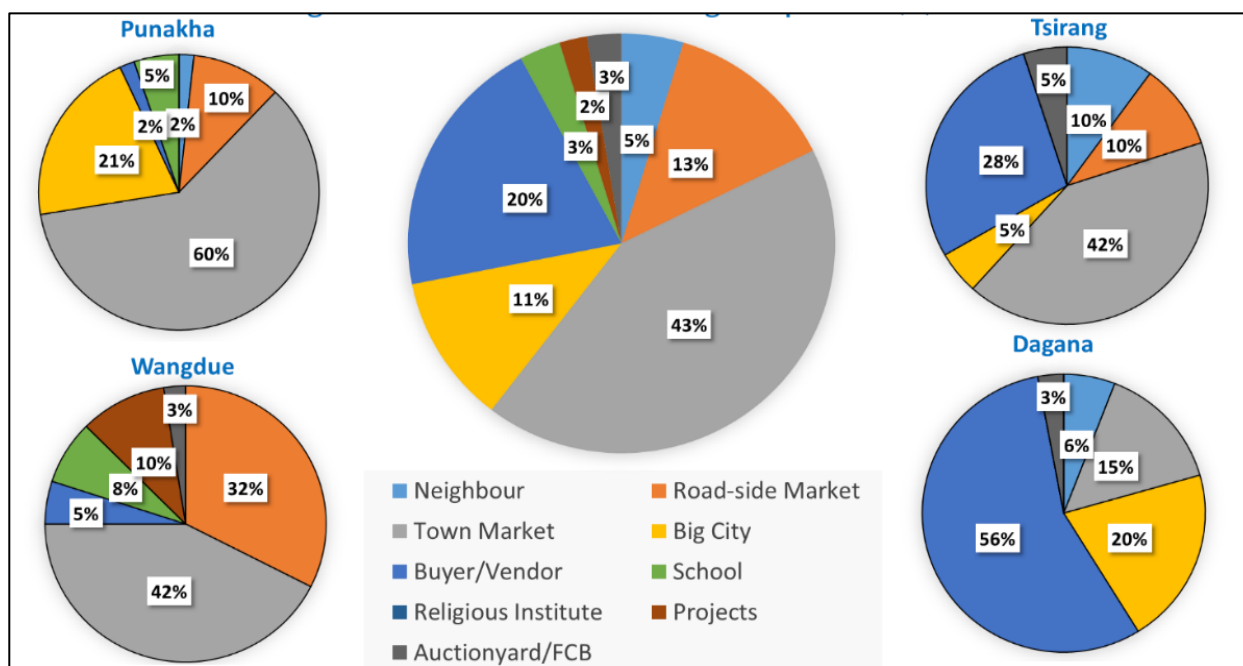


Figure 1-61: Fruit and nuts market composition (%)

Production, marketing ratio and income were high in Tsirang and Punakha. While Mandarin was top income fruit crop in all Dzongkhags, Pear came in second rank (marketing farmers 10 and average income Nu. 20,290 that was closer to Mandarin), Banana is second fruit in Tsirang (marketed by famers 17 and average income from Banana was Nu. 17,337). Dagana also had high income from Fruit/Nut but it is almost from Mandarin. Average income from Fruits/Nuts in Wangdue was much lower than other three Dzongkhags.

Table 1-42: Farmers Cultivated Top 10 Fruit & Nut crops, its Production and Income (Nu.) in Dzongkhag

	Cul. Farmer	Production (Kg)		Marketing		Income (Nu)		
		Total	*HF Ave.	No	%/T-Cul	Total	**MF Ave.	**MF Max.
Punakha (n42)								
Mandarin	19	11,149	697	12	63%	274,600	22,883	120,000
Pear	22	6,339	453	10	45%	202,900	20,290	75,000
Passion Fruit	4	6,160	1,540	2	50%	71,500	35,750	70,000
Peach	25	2,279	127	10	40%	64,000	6,400	15,000
Guava	15	4,590	353	7	47%	50,700	7,243	30,000
Plum	7	895	179	3	43%	37,000	12,333	20,000
Persimmon	13	3,401	486	4	31%	19,400	4,850	12,000
Banana	7	387	77	4	57%	16,200	4,050	10,000
Lime / Lemon	5	76	59	2	40%	10,000	5,000	5,000
Mango	8	250	50	3	38%	9,400	3,133	5,000
Wangdue (n49)								
Mandarin	28	12317	560	7	25%	126,800	18,114	15850
Apple	7	1097	219	1	14%	20,000	20,000	20000
Pear	26	2380	149	4	15%	18,500	4,625	9100
Banana	17	791	47	8	47%	13,000	1,625	4170
Mango	6	660	165	2	33%	13,000	6,500	10000
Soft Shell walnut	13	131	19	2	15%	10,500	5,250	9000
Peach	23	1979	110	4	17%	8,920	2,230	7500
Persimmon	19	2513	157	3	16%	8,200	2,733	5000
Passion Fruit	8	110	18	1	13%	2,000	2,000	2000
Pine Apple	4	132	33	2	50%	1,150	575	1000
Tsirang (n43)								
Mandarin	33	53,900	3,171	19	58%	1,100,250	57,908	500,000
Banana	31	20,592	858	17	55%	294,735	17,337	240,000
Papaya	13	958	87	8	62%	15,200	1,900	8,000
Peach	20	2,290	121	4	20%	14,480	3,620	12,500
Plum	14	2,150	179	6	43%	10,800	1,800	1,800
Other (sugarcane)	4	920	230	2	50%	9,800	4,900	9,000
Pear	15	5,675	473	6	40%	8,700	1,450	2,000
Guava	16	73	5	2	13%	4,300	2,150	4,000
Passion Fruit	7	225	32	3	43%	3,000	1,000	2,500
Pomegranate	19	238	20	3	16%	2,600	867	2,000
Dagana (n50) *only 9 fruit were marketed								
Mandarin	37	114,038	4,224	22	59%	934,200	42,464	160,000
Lime / Lemon	6	960	240	2	33%	16,200	8,100	16,000
Banana	31	4,924	170	8	26%	13,100	1,638	6,000
Jack Fruit	14	2,409	301	3	21%	8,000	2,667	5,000
Mango	28	3,827	273	2	7%	3,900	1,950	3,000
Peach	30	3,019	135	2	7%	2,500	1,250	2,000
Litchi	10	55	28	1	10%	2,000	2,000	2,000
Guava	29	3,171	132	1	3%	1,000	1,000	1,000
Passion Fruit	9	136	23	1	11%	500	500	500
* HF: Harvested Farmer. MF: Marketing Farmer								

Passion Fruit average income in Punakha was high but only two (2) farmers were involved. Similarly, in Wangdue, income from sale of Apple was high but there was only 1 farmer who sold it out of seven (7). Although Mandarin production in Dagana was almost double compared to Tsirang, income from Mandarin was less. Average price of Mandarin by calculation was Nu. 24.6/Kg in Punakha, Nu. 10.3/Kg in Wangdue, Nu. 20.4/Kg in Tsirang and Nu. 8.2/Kg in Dagana. This big difference could be due to the inaccurate information on production/income coupled by their tendency of minimizing the income.

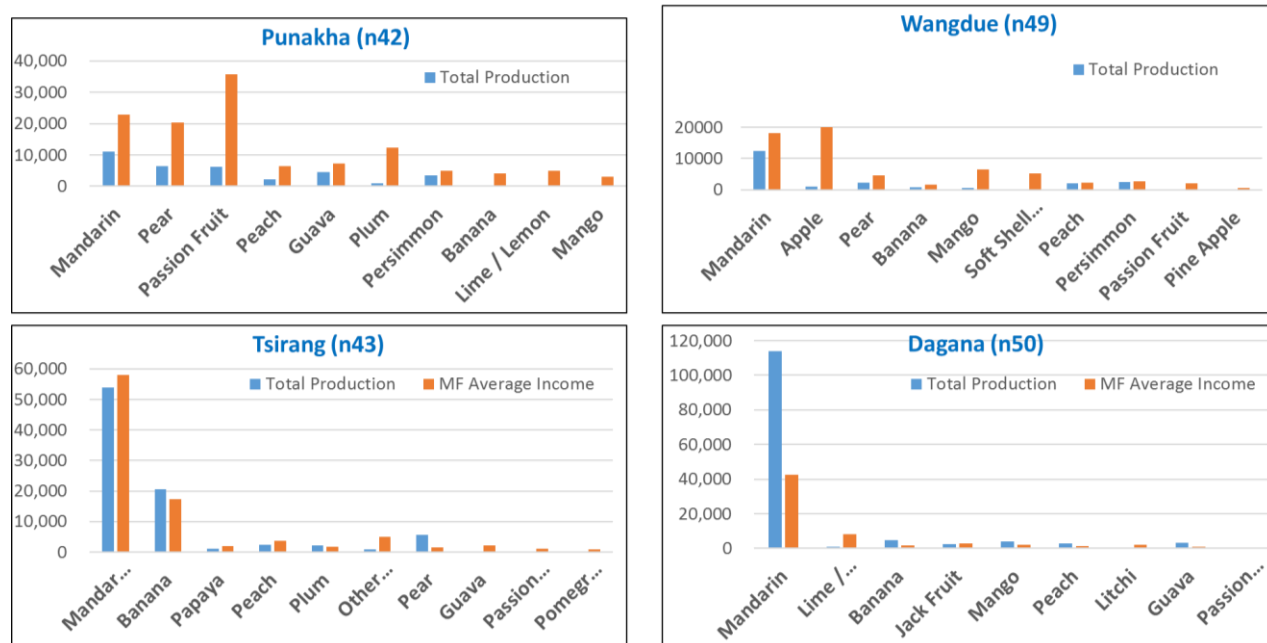


Figure 1-62: Total production (kg) and Income (Nu.) from top 10 fruits and nuts

1.7.4.6 Suitable Fruit/Nut Crops

Top three (3) reasons that farmers consider cultivation and choice of Fruit/Nut crops to be suitable were; Easy Cultivation (29%), High Demand/Price (27%) and High Yield (23%). Dzongkhag wise study showed Peach and Pear as the most suitable fruit in Punakha. Pear, Mandarin and Persimmon were ranked as suitable crop in Wangdue. Mandarin, Plum and Peach were preferred in Tsirang. Other crops such as Sugarcane Mandarin and Mango was listed in Dagana.

Table 1-43: Top 11 Suitable Fruit and Nut Crops and Reason

	Total No.	Reason								
		Easy Culti.	High Yield	Pest/ Dise ase Resis.	High Dema nd /Price	Multiple Harvest	Easy Trans port.	Good shelf life	Relay Cropp ing	Others
Mandarin	51	35	25	2	38	8	10	3	0	2
Peach	51	35	30	4	25	4	5	1	0	5
Pear	45	30	29	3	30	6	4	2	0	1
Mango	31	17	16	2	20	2	4	0	1	0
Avocado	25	13	9	3	22	1	1	2	0	3
Other	25	17	8	3	21	0	4	2	0	5
Persimmon	24	13	15	5	14	4	2	0	0	3
Banana	22	19	15	7	11	2	2	0	0	1
Plum	22	19	8	3	6	0	1	0	0	1
Guava	16	14	9	3	5	0	4	3	0	2
Soft Shell walnut	15	12	6	3	12	1	4	1	0	0

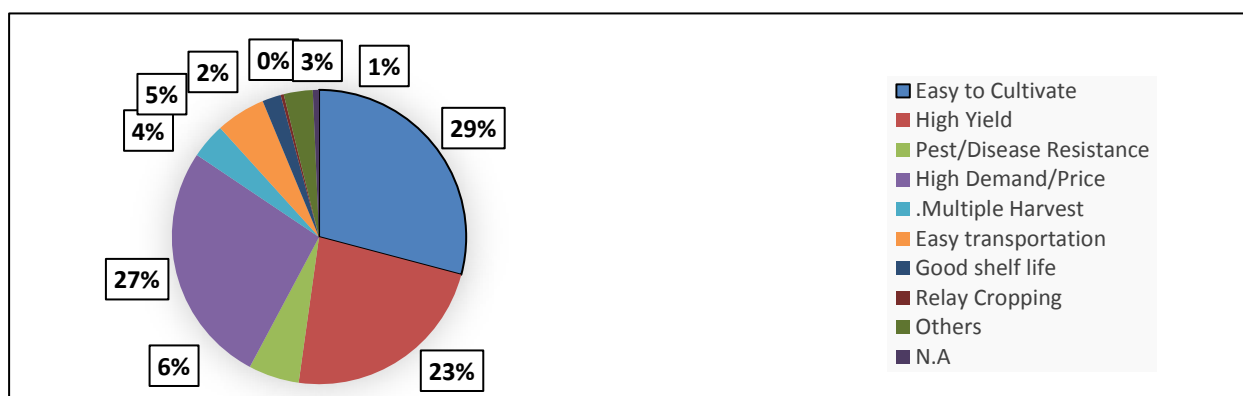


Figure 1-63: Reason of selecting suitable fruit and nut by farmers (%)

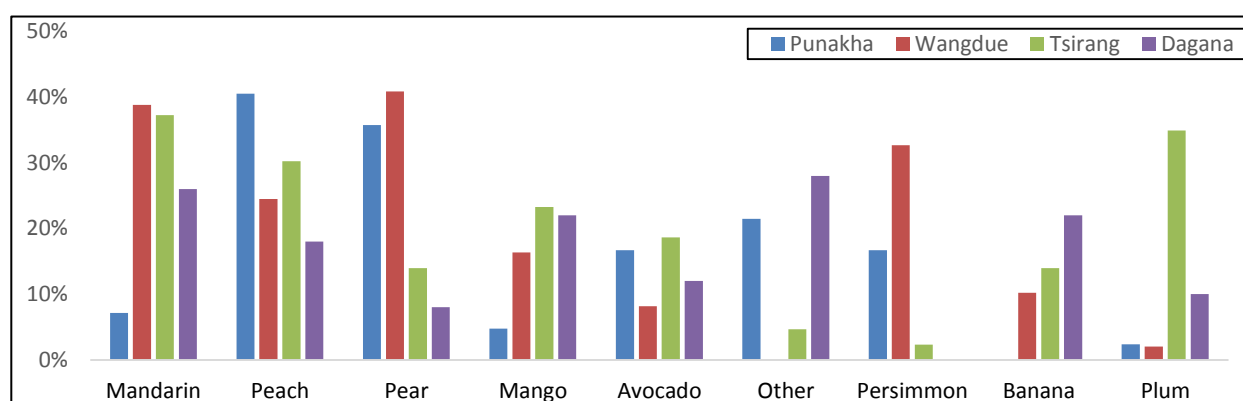


Figure 1-64: Top 9 fruits and nuts of farmers' choice (%) in four Dzongkhags

1.7.4.7 Interested New Fruit/Nut Crops

Out of 184 farmers, 175 (95%) of them had interest for new Fruit/Nut, however more than half (93) of them had no idea about which new crop to cultivate. Top 3 reasons of their interest were; High Demand/Price 33%, High Yield 26%, Easy Cultivation 21%. The order is different from Vegetable (Easy Cultivation 24%, High Demand/Price 24%, High Yield 21%). It indicates that farmers were more concerned of income when it comes to Fruit/Nut. In terms of Dzongkhag, Mango came on top in Punakha and Tsirang while Dagana farmers had not much idea on new Fruit/Nut crop to cultivate.

Table 1-44: Top 10 Interested Fruit/Nut Crops and Reason

	Total	Reason								
		Easy to Cultivate	High Yield	Pest/ Disease Resi.	High Demand/ Price	Multiple Harvest	Easy Transportation	Good shelf life	Relay Cropping	Others
Avocado	35	15	16	6	28	1	1	2	1	1
Litchi	16	7	6	1	12	3	1	0	0	0
Persimmon	13	3	9	1	12	0	1	2	0	3
Mango	13	6	7	0	9	1	0	0	1	2
Pear	11	4	10	0	9	0	1	0	0	0
Peach	11	6	6	1	8	0	2	1	0	2
Other	11	5	8	0	7	0	0	1	0	4
Soft Shell walnut	8	4	7	2	6	0	0	2	0	0
Chestnut	7	4	4	1	6	0	1	1	0	0
Plum	6	3	5	0	5	0	0	0	0	0
Avocad	35	15	16	6	28	1	1	2	1	1

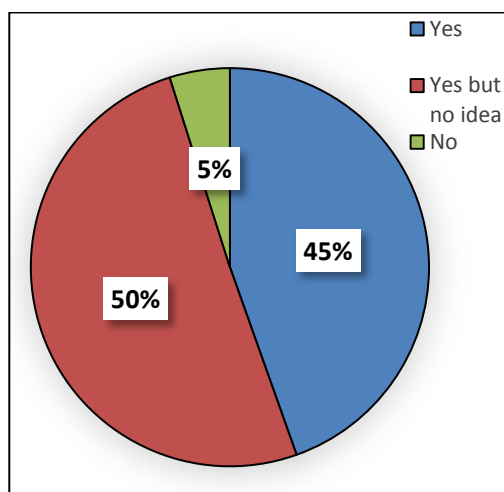


Figure 1-65: Farmers interest for new fruits and nuts (%)

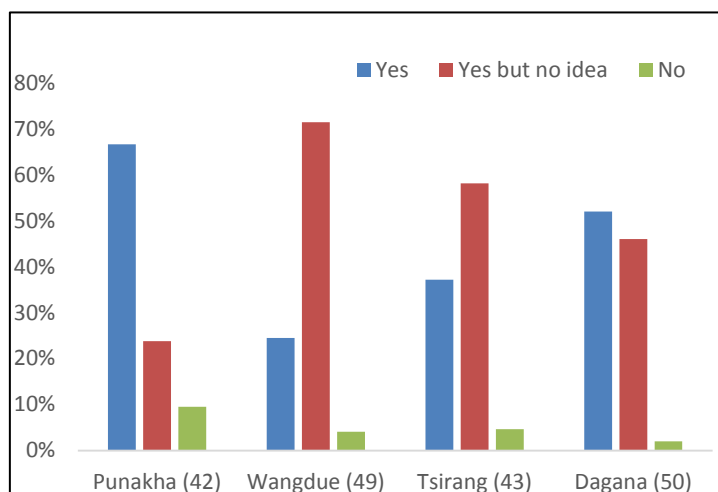


Figure 1-66: Farmers interest on new fruits and nuts in four Dzongkhags (%)

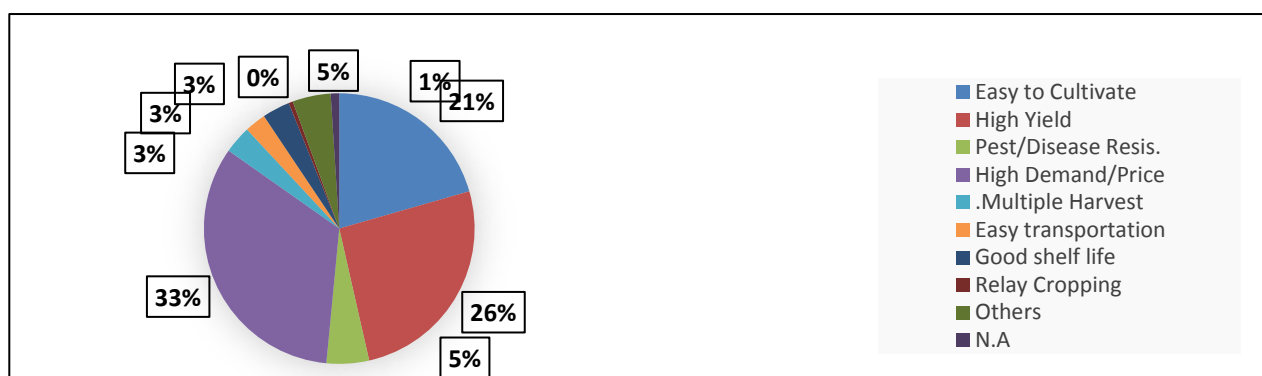


Figure 1-67: farmers' reason for selecting new fruits and nuts

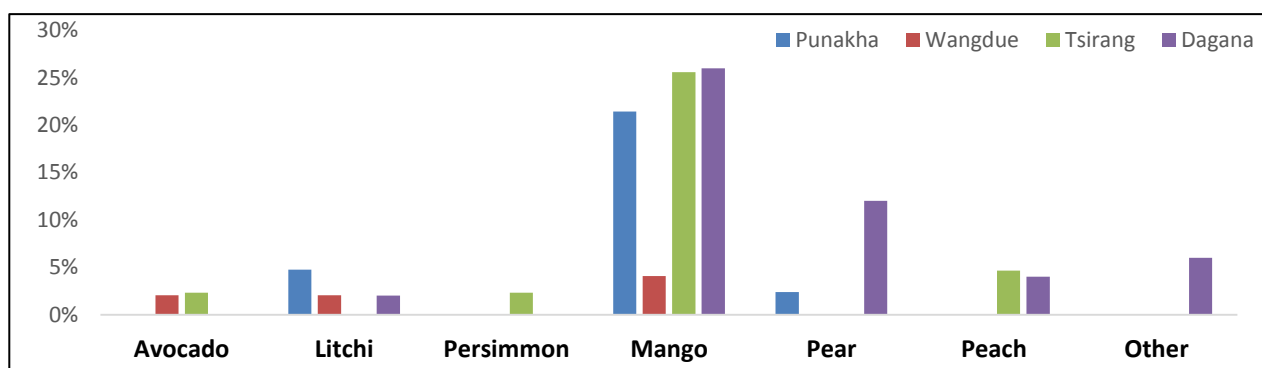


Figure 1-68: Top 7 fruits and nuts interested by farmers

1.7.5 Problems/Constraints on Fruit/Nut cultivation

Out of 184 farmers, 92% of them expressed to have Problems/Constraints on Fruit/Nut cultivation. The top 3 problems were; Water shortage (63%), Pest/Disease (46%) and Wild Animal (35%).

Table 1-45: Problems/Constraints on Fruit/Nut cultivation

	Total	Most Serious	Serious	Least Serious	%
Water shortage	115	78	33	4	63%
Pest/Disease	84	31	32	21	46%
Wild Animal Damage	64	27	23	14	35%
Knowledge/Skill	62	21	23	18	34%
Man power	51	22	21	8	28%
Seed/seedling availability	36	20	11	5	20%
Poor Soil Fertility	23	5	9	9	13%
Market Access	20	6	5	9	11%
Poor Seed/Seedling	17	7	5	5	9%
Limited Fund	14	6	3	5	8%
Other	14	3	5	6	8%
Low Market Price	9	4	3	2	5%
Limited Land	5	1	3	1	3%
Natural Disaster	4	2	1	1	2%
Persistent Weeds	0	0	0	0	0%

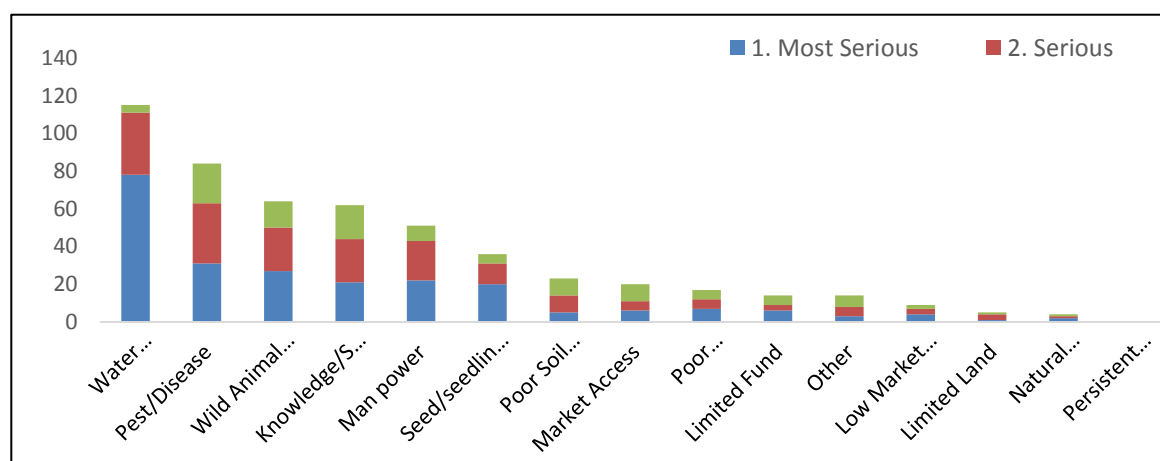


Figure 1-69: Ranking of problems and constraints on fruits and nuts cultivation

Altitude wise, while Water shortage and Pest/Disease were equally rated high in all ranges, Wild Animal Damage came on top in high altitude range.

Table 1-46: Problems/Constraints on Fruit/Nut cultivation by Masl

	<1000m (n49)		1001~1600m (n82)		>1601m (n52)	
	Total	%	Total	%	Total	%
Water shortage	34	69%	51	62%	30	58%
Pest/Disease	23	47%	37	45%	24	46%
Wild Animal Damage	10	20%	21	26%	33	63%
Knowledge/Skill	19	39%	22	27%	21	40%
Man power	7	14%	28	34%	16	31%
Seed/seedling availability	12	24%	11	13%	13	25%
Poor Soil Fertility	5	10%	8	10%	10	19%
Market Access	7	14%	11	13%	2	4%
Poor Seed/Seedling	5	10%	5	6%	7	13%
Limited Fund	8	16%	5	6%	1	2%
Other	4	8%	8	10%	2	4%
Low Market Price	4	8%	5	6%	0	0%
Limited Land	3	6%	0	0%	2	4%
Natural Disaster	0	0%	0	0%	4	8%
Persistent Weeds	0	0%	0	0%	0	0%

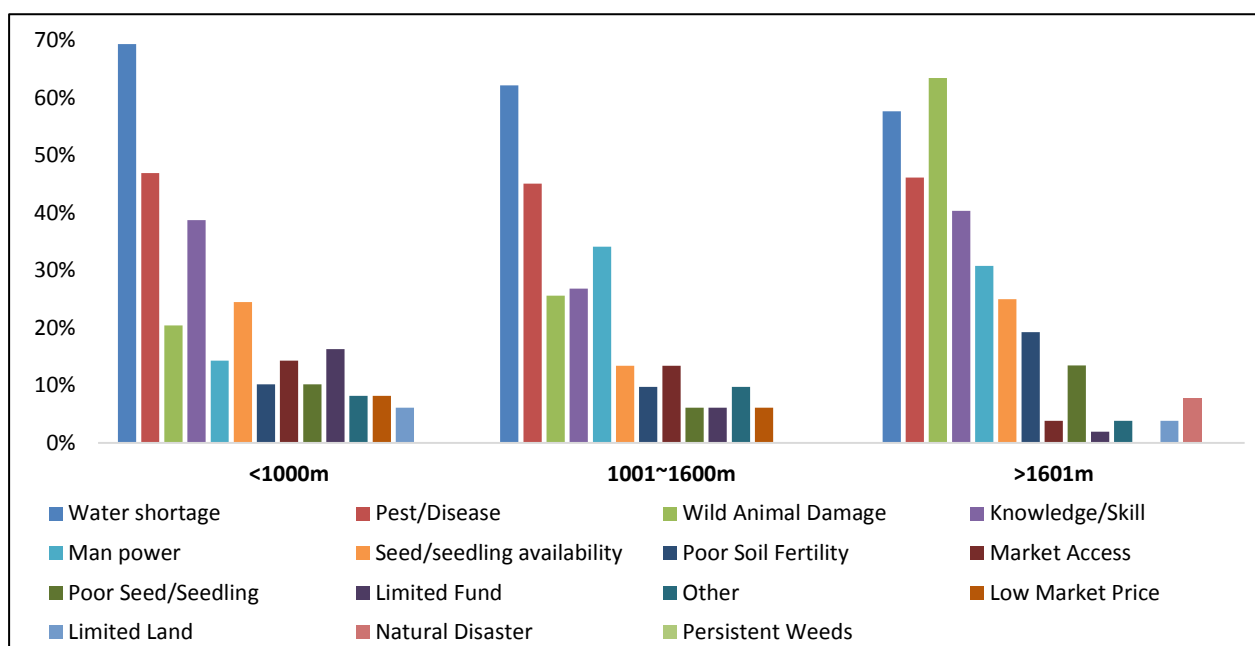


Figure 1-70: Problems/constraints in fruits and nuts production in MASL (%)

1.7.6 Livestock

1.7.6.1 Livestock Raising

Farmers in Dagana and Tsirang raised more Livestock. 141 farmers (77%) raised Dairy Cattle and 92 Farmers (50%) raised Draught Animal. The ratio of Draught Animal was high in Dagana (76%) and Tsirang (70%) and significantly low in Wangdue (10%). The number of drought animal inversely correlated with farm machinery holdings. Goat/Sheep was raised only in Tsirang and Dagana. In terms of Poultry, raising ratio was high in Dagana (65%) but number of heads was low (22 heads par raised farmer), while Tsirang (Ave. 256 heads) followed by and Punakha (Ave. 73 heads). There were only 4 (2%) farmers raising fish (Fishery).

Table 1-47: Farmers Raising Livestock and Livestock Heads (No)

(Poultry in 100 heads, Fishery in 1000 heads)

	Punakha (n42)			Wangdue (n49)			Tsirang (n43)			Dagana (n50)		
	Far mer	Lives tock Heads	Ave. Heads	Far Mer	Lives tock Heads.	Ave. Heads	Far Mer	Lives tock Heads	Ave. Heads	Far Mer	Lives tock Heads	Ave. Heads
Draught Animal	21	105	5	5	11	4	30	62	2	38	127	3
Ox/Cow	21	105	5	4	10	3	29	60		38	127	3
Buffalo	0			0			1	2	2	0		
Horse	0			1	1	1	0			0		
Dairy Cattle/Calf	31	81	3	28	85	3	35	102	3	47	152	3
Goat/Sheep	0			0			20	102	5	25	134	5
Poultry	6	437	73	4	93	23	15	3,837	256	32	697	22
Swine (pig)	0			0			5	11	2	5	9	2
Fishery	1	2,000	2,000	0			2	3,000	1,500	1	1,500	1,500
Others (turkey)	0			0			1	4	4	0		

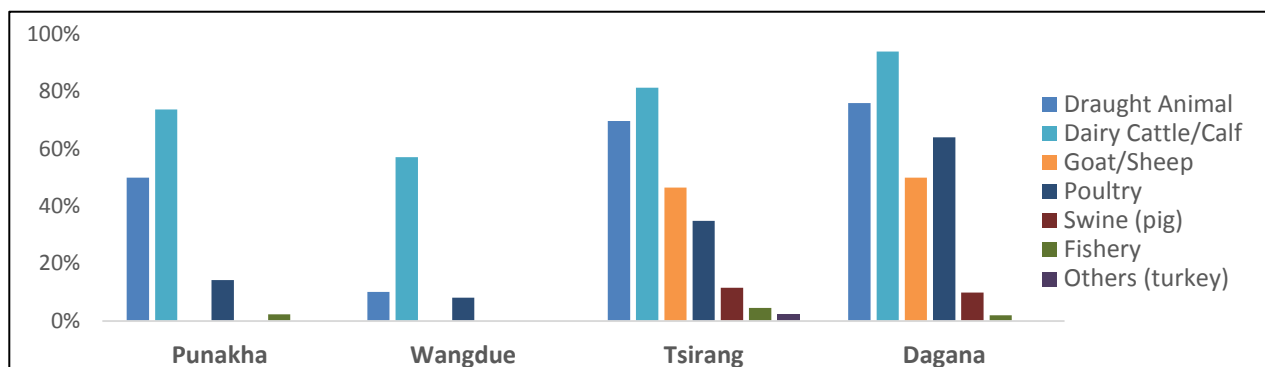


Figure 1-71: Percentage of farmers raising livestock

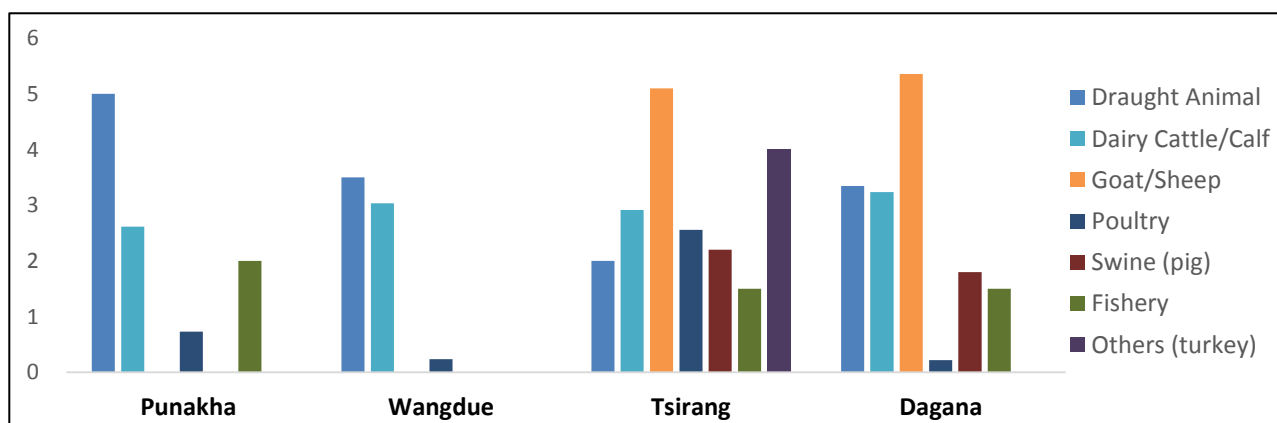


Figure 1-72: Average livestock heads (poultry in 100 and fishery in 1000)

1.7.6.2 Livestock Marketing and Income

On average, 60 % of Dairy Cattle raising farmers were marketing their product and earned Nu. 25,218 (Max. Nu. 156,000) while only 15% of Poultry raising farmers sold their produce and earn average income of Nu. 48,812 (Max. 226,800Nu). Draught Animal and Goat/Sheep marketing was very rare or unaccounted. Dzongkhag wise, on average, Tsirang farmers earned maximum of Nu. 38,058 followed by Punakha Nu. 25,101, and Wangdue Nu. 19,129. Dagana earned lowest income of Nu. 17,509 from livestock products.

Table 1-48: Farmers (No.) Marketing Livestock Products and Income (Nu)

	Punakha (n42)			Wangdue (n49)			Tsirang (n43)			Dagana (n50)		
	*M F	Total Income	Ave. Income	*MF	Total Income	Ave. Income	*M F	Total Income	Ave. Income	*M F	Total Income	Ave. Income
Draught Animal	0			5	124,000	24,800	2	47,500	23,750	2	47,500	23,750
Ox/Cow	0			4	74,000	18,500	2			2		
Buffalo	0			0			0			0		
Horse	0			1	50,000	50,000	0			0		
Dairy Cattle/Calf	26	934,680	35,949	27	672,420	24,904	26	927,430	35,670	31	264,640	8,537
Goat/Sheep	0						7			3		
Poultry	5	119,560	23,912	4	16,900	4,225	9	642,360	71,373	9	539,100	59,900
Swine (pig)	0			0			1	9,000	9,000	3	24,000	8,000
Fishery	0			0			1	3,000	3,000	1	200	200
Others (turkey)	0			0			1	7,200	7,200			

*MF: Marketing Farmer

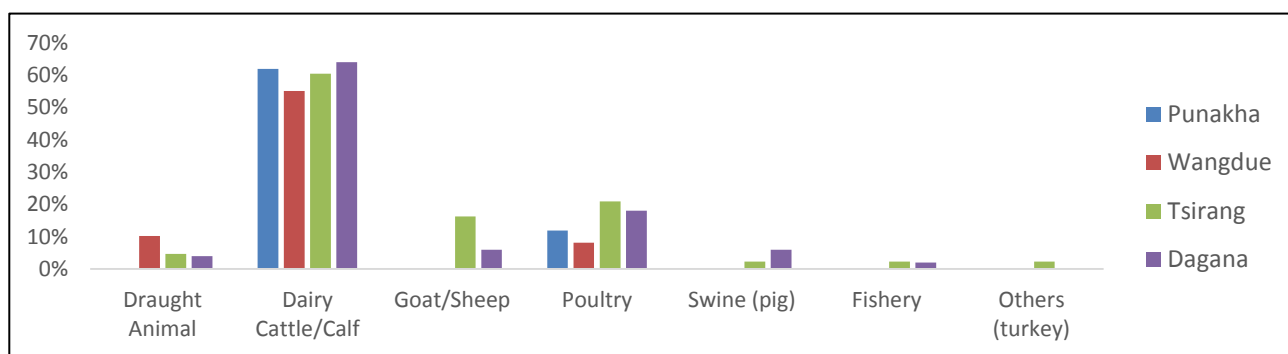


Figure 1-73: Percentage of farmers engaged in livestock products marketing

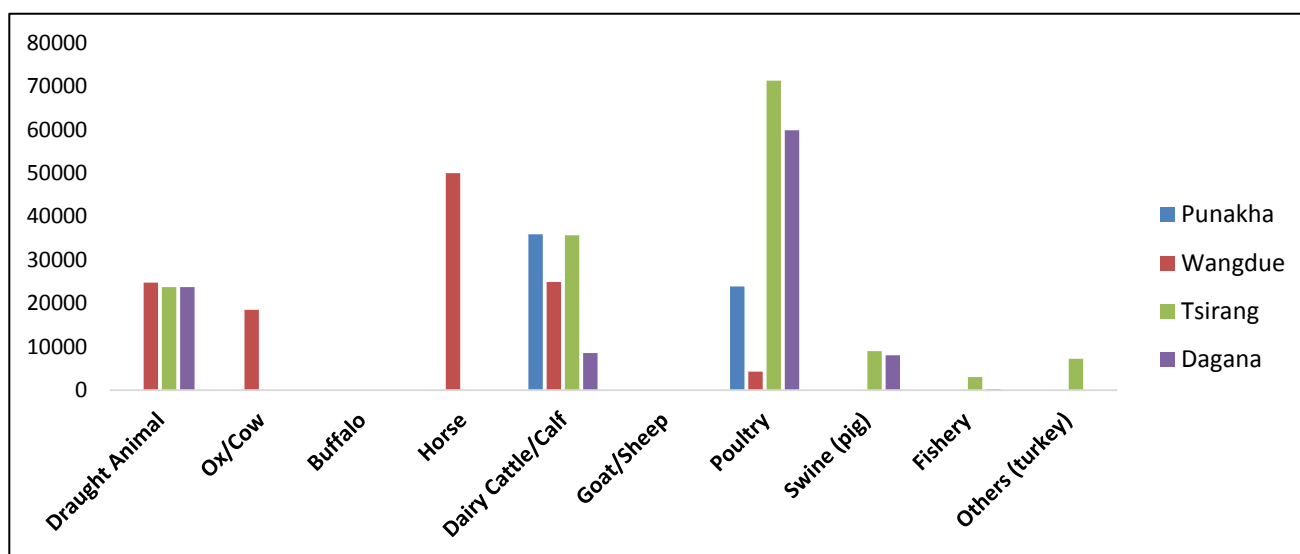


Figure 1-74: Average annual income (Nu.) from livestock products

1.7.7 Non-Woods Forest Product (NWFP)

It was found that 48% of farmers harvested Ferns while Mushroom was harvested by 33%. Bamboo shoot and others forest products accounted to 4%. Medicinal Plants constituted to only 1% of the respondents. In terms of production (harvest), on average, Bamboo shoot was top with 71kg, followed by Ferns (27 kg) and Mushroom (15kg). Most of NWFP were consumed at home, hence marketing ratio was quite low (Ferns 11%, Mushroom 5% then Bamboo shoot and Others 2%) thus , the income from NWFP was low. Dzongkhag wise, Wangdue had relatively high average income (Nu. 3,570), and next was Punakha (Nu. 2,596), Dagana (Nu. 2,500). Tsirang had highest number of farmers harvesting NWFP and harvested quantity was much higher than Dagana, however, the average income was the lowest (Nu. 856).

Table 1-49: Farmers (No.) Harvesting/Marketing NWFP, Harvest (Kg) and Income (Nu)

	Punakha (n42)				Wangdue (n49)				Tsirang (n43)				Dagana (n50)			
	* HF No	** MF No	Ave. Har vest (kg)	Ave. Inco me (Nu)	* HF No	** MF No	Ave. Har vest (kg)	Ave. Inco me (Nu)	* HF No	** MF No	Ave. Har vest (kg)	Ave. Inco me (Nu)	* HF No	** MF No	Ave. Har vest (kg)	Ave. Inco me (Nu)
Ferns	16	8	53	2,433	11	6	43	3,483	25	5	19	810	36	1	16	3,000
Mushroom	10	2	10	3,250	15	4	22	5,800	13	2	25	1,150	23	1	8	2,000
Bamboo shoot					2	2	131	3,600	1	1	262	500	5	0	9	
Medicinal Plant	1	0	5						1							
Others	2	0	4		5	4	14	1,458								

*HF: Harvest Farmer, **MF: Marketing Farmer

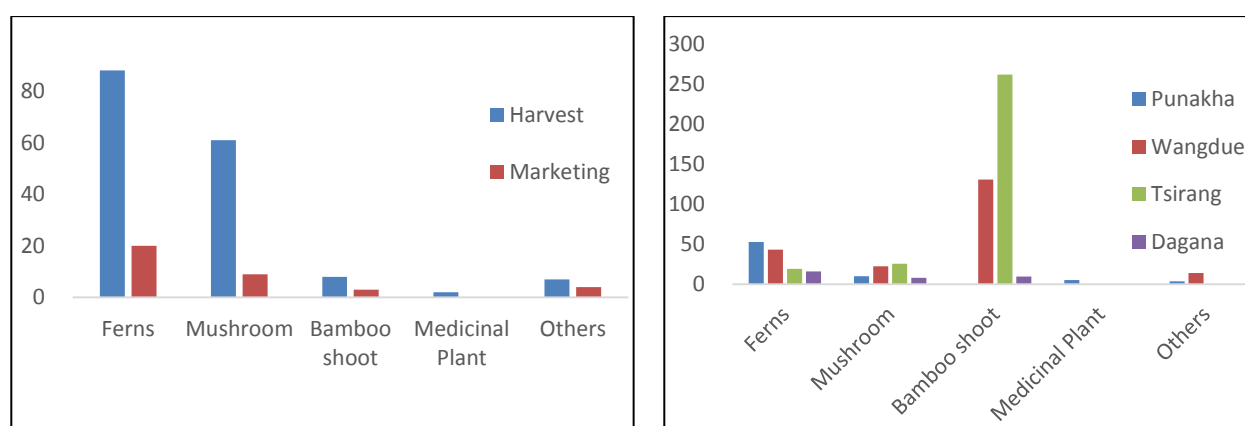


Figure 1-75: Number of farmers harvesting and marketing (average kg)

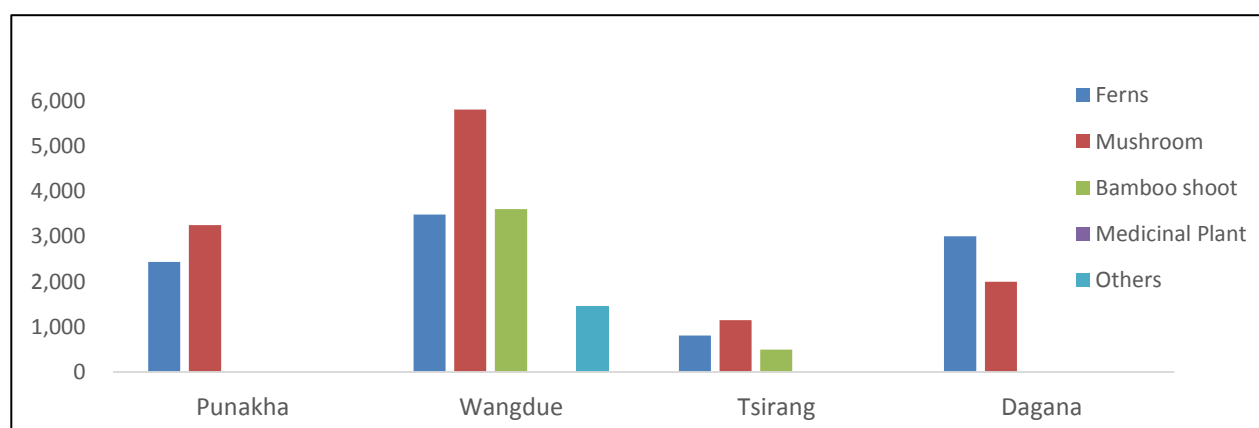


Figure 1-76: Average annual income (Nu.) from NWFP Marketing

1.8 Farmers Group

Out of 184, 83 (45%) farmers were engaged in group activities. Out of 120 existing groups, 89 (84%) were registered. However, activity of groups (multiple answers) were mainly Production (91) and Marketing (35). In terms of income, only 27 (23%) had income as group. Group income highest ratio was found for “Food processing” (60%) followed by “Agricultural Production” group (55%). No income was reported by “Vegetable Production” group farmers. Some of respondents who were member were not aware about

group activities and income but they were simply engaged by name (head count). There were not much of productive group activities undertaken.

Table 1-50: Famers Engaged in Group (No.), Group Activities (multiple count) and Income (Nu.)

Engaged	83	45%	Group Resisted		Activities				Group has Income	
Not Engaged	101	55%			Produ ction	Mark eting	Manag ement	Other		
Community Forest	51	28%	47	92%	42	8	8	0	11	22%
Milk Production	13	7%	12	92%	12	5	0	0	3	23%
Livestock	12	7%	11	92%	8	5	0	0	1	8%
Agri. Production	11	6%	8	73%	11	7	0	0	6	55%
Water User	7	4%	2	29%	1	3	3	0	0	0%
Vegetable Production	7	4%	5	71%	5	2	2	0	0	0%
Food Processing	5	3%	4	80%	5	2	0	0	3	60%
Other	14	8%	8	57%	7	3	3	2	3	21%
Total	120		97	81%	91	35	16	2	27	23%

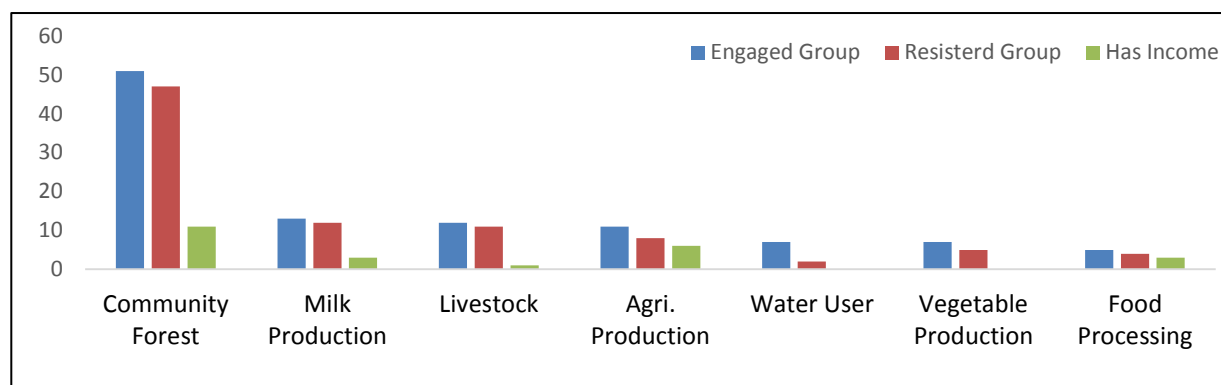


Figure 1-77: Farmers engaged in group (No.) and their income (Nu)

Dzongkhag wise, Dagana had highest ratio of farmers engaged in Group (62%), next was Wangdue (53%), and lowest was Punakha (29%). Community forest ratio was relatively high in Dagana and Wangdue while Livestock (Dairy) group was relatively more in Tsirang.

Table 1-51: Famers Engaged in Group Engaged in Dzongkhag (No.)

	Punakha (n42)		Wangdue (n49)		Tsirang (n43)		Dagana N50)	
Engaged	12	29%	26	53%	14	33%	31	62%
Not Engaged	30	71%	23	47%	29	67%	19	38%
Comm. Forest	6	14%	16	33%	9	21%	20	40%
Milk Production	2	5%	5	10%	1	2%	5	10%
Livestock	0	0%	1	2%	7	16%	4	8%
Agri. Production	0	0%	5	10%	5	12%	1	2%
Water User	0	0%	3	6%	0	0%	4	8%
Vege. Production	0	0%	2	4%	2	5%	3	6%
Food Processing	0	0%	3	6%	0	0%	2	4%
Other	4	10%	3	6%	2	5%	5	10%
Total	8		35		24		39	

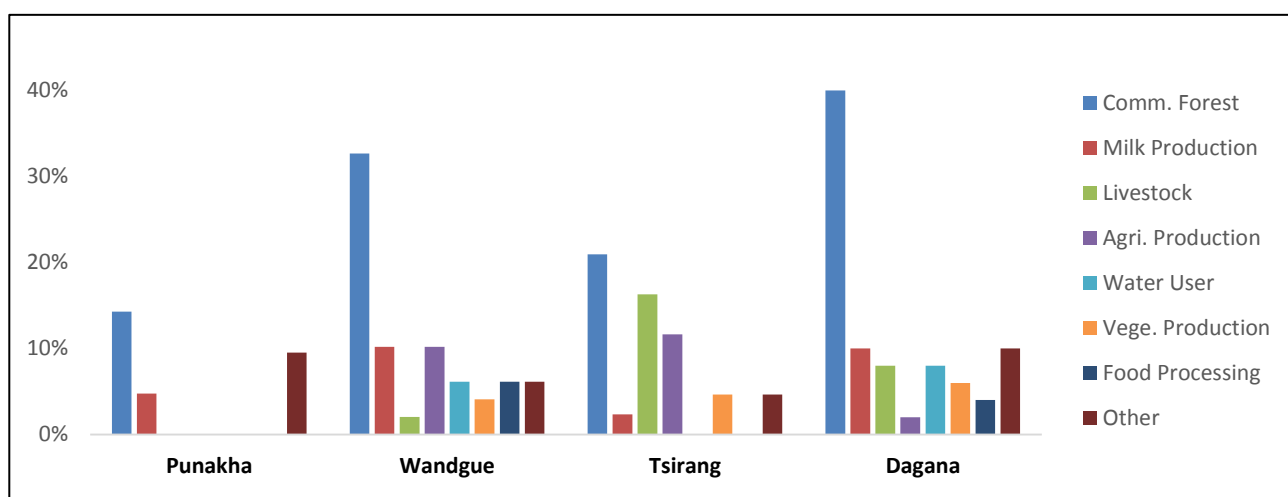


Figure 1-78: Farmers engaged in group activities (%)

1.9 Training/Guidance Attended and Requirement

1.9.1 Attended Horticulture Related Training/Guidance

A total of 83 (45%) farmers attended Training and/or Guidance provided to them. Almost half of farmers had some of Training and/or Guidance in Wangdue (51%), Tsirang (51%) and Dagana (54%) whereas the ratio in Punakha was relatively low (36%).

	Attended		Not Attended	
Punakha	15	36%	27	64%
Wangdue	24	49%	25	51%
Tsirang	21	49%	22	51%
Dagana	23	46%	27	54%
Total (184)	83	45%	101	55%

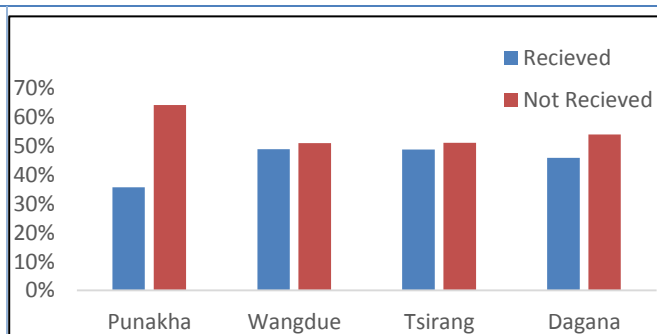


Figure 1-79: Farmers who attended trainings

As per subject on which training and/or guidance is provided, 28% farmers attended session on Vegetable production, 20% on Fruit Orchard management, 7% on Pest & Disease Manage, 5% on Vegetable seed production and Fruit Nursery production.

Table 1-53: Training/Guidance Attended by Subject (No.)

Subject/Topics	Punakha (n42)		Wangdue (n49)		Tsirang (n43)		Dagana (n50)		Total (n184)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Vege. production	14	33%	15	31%	11	26%	11	22%	51	28%
Fruit Orchard manage.	6	14%	8	16%	12	28%	11	22%	37	20%
Pest & Disease Manage.	5	12%	3	6%	3	7%	1	2%	12	7%
Soil Management	2	5%	2	4%	6	14%	1	2%	11	6%
Vege. seed production	4	10%	2	4%	2	5%	2	4%	10	5%
Fruit Nursery production	4	10%	2	4%	0	0%	3	6%	9	5%
Irrigation Manage.	1	2%	3	6%	1	2%	0	0%	5	3%
Food Preservation/Process.	0	0%	1	2%	1	2%	0	0%	2	1%
Agri. Machinery Operation	1	2%	0	0%	1	2%	0	0%	2	1%
Group/Account manage.	1	2%	1	2%	0	0%	0	0%	2	1%
Harvest/Post Harvest	0	0%	1	2%	0	0%	0	0%	1	1%
Other	1	2%	0	0%	0	0%	0	0%	1	1%
Total	39	93%	38	78%	37	86%	29	58%	143	78%

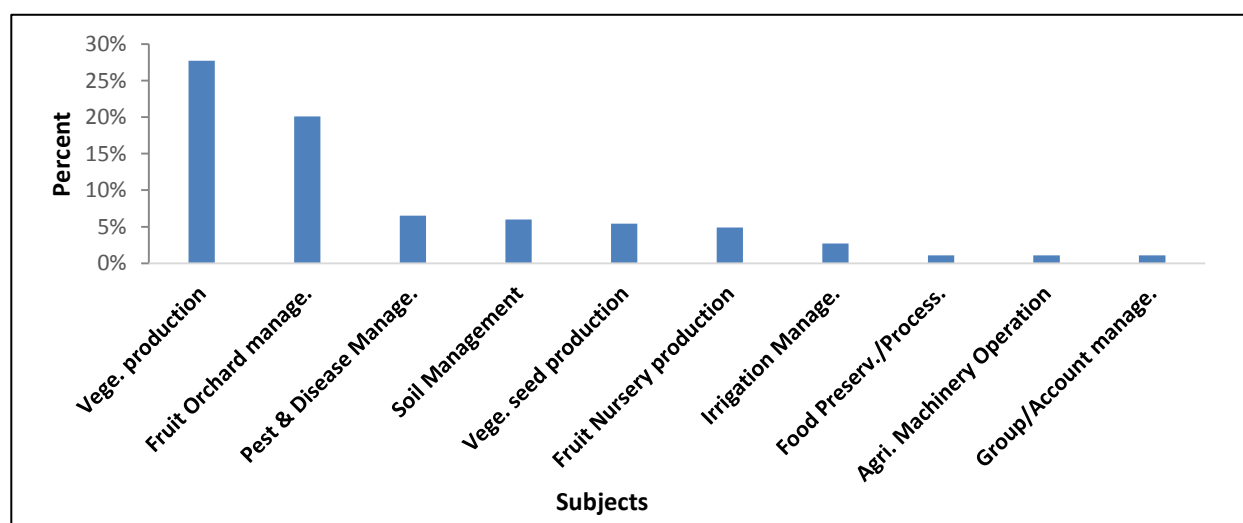


Figure 1-80: Top 10 training or guidance on subject (%) attended by farmers

About 60% of Training/Guidance they attended was carried out in mode that had both lecture and practical session. The Practical was attended 18% when 16% was lecture and only 6% was Observation tour.

Table 1-54: Mode of Attended Training/Guidance (No.)

Subject/Topics	Lecture	Practical	Lecture & Practical	Observation /Study Tour	Others
Vege. production	9	10	31	1	0
Fruit Orchard manage.	2	7	26	2	0
Pest & Disease Manage.	3	3	6	0	0
Soil Management	1	0	9	1	0
Vege. seed production	1	2	5	2	0
Fruit Nursery production	1	3	3	2	0
Irrigation Manage.	5	0	0	0	0
Food Preservation/Processing	0	0	2	0	0
Agri. Machinery Operation	1	1	0	0	0
Group/Account manage.	0	0	2	0	0
Other	0	0	2	0	0
Harvest/Post Harvest	0	0	1	0	0
Total	23	26	87	8	0

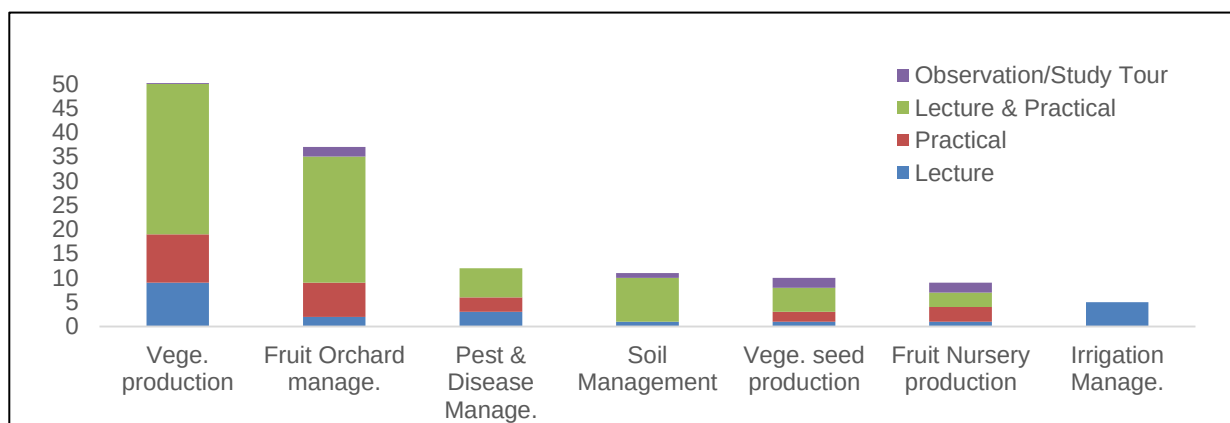


Figure 1-81: Number of farmers who attended top 7 training/ guidance mode

77% of Training were organized by Dzongkhag Agriculture Sector, 14% by ARDC Bajo including ARDSC Mithun.

Table 1-55: Organizer and Training/Guidance provided for different subjects (No.)

Subject/Topics	DAO/ Gewog	ARDC	AMC	NPPC	Other RGB	Japan /JICA	UN/ WB	Other Donor	NGO
Vege. production	45	2	0	0	2	0	0	1	0
Vege. seed production	6	3	0	0	1	0	0	0	0
Fruit Nursery production	4	3	0	0	0	1	0	1	0
Fruit Orchard manage.	26	9	0	0	0	1	0	1	0
Soil Management	9	1	0	1	0	0	0	0	0
Irrigation Manage.	4	1	0	0	0	0	0	0	0
Pest & Disease Manage.	8	0	0	3	0	0	0	0	0
Harvest/Post Harvest	1	0	0	0	0	0	0	0	0
Food Preservation /Process.	0	1	0	0	0	0	0	0	0
Agri. Machinery Operation	1	0	1	0	0	0	0	0	0
Group/Account manage.	2	0	0	0	0	0	0	0	0
Other	1	0	0	0	0	0	0	0	0
Total	107	20	1	4	3	2	0	3	0

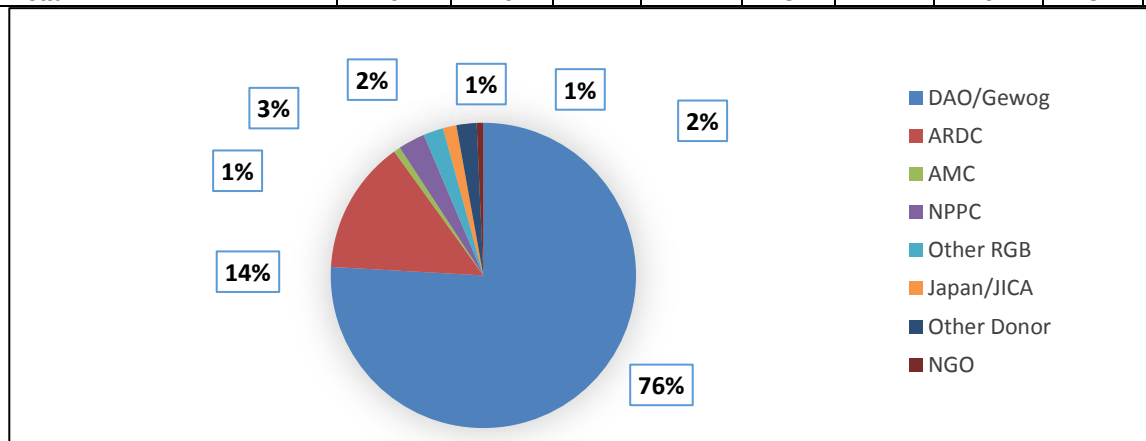


Figure 1-82: Training/Guidance organizer (%)

Out of 144 who attended Training/Guidance, 79% of Training/Guidance attended farmers evaluated training/guidance as positive (Very Useful 55%, Useful 24%). Only 6 % rated it as "Not Useful".

Unsatisfactory reasons were “Not Practical/Applicable” and “Difficult to Master/Understand” 25%, other was 37% and “No Answer” 13%.

Table 1-56: Evaluation of Training/Guidance attended (No.)

	Evaluation					Not Useful Reason						
Subject/Topics	Very Useful	Useful	Neutral	Not Useful	N.A.	Not Relevant	Not Practical	Difficult to Master	Wrong Timing	Other.	N.A.	
Vegetable production	33	11	7	0	0	0	0	0	0	0	0	
Vegetable seed production	3	3	3	1	0	0	0	0	0	1	0	
Fruit Nursery production	4	4	0	1	0	0	1	0	0	0	0	
Fruit Orchard management	22	8	5	2	0	0	0	1	0	1	0	
Soil Management	4	3	3	1	0	0	1	0	0	0	0	
Irrigation Management	3	1	0	1	0	0	0	1	0	0	0	
Pest & Disease Management	5	3	3	1	0	0	0	0	0	0	1	
Harvest/Post Harvest	0	1	0	0	0	0	0	0	0	0	0	
Food Preservation/Processing	2	0	0	0	0	0	0	0	0	0	0	
Agri. Machinery Operation	1	0	0	1	0	0	0	0	0	1	0	
Group/Account management	2	0	0	0	0	0	0	0	0	0	0	
Other	0	1	0	0	0	0	0	0	0	0	0	
Total	79	35	21	8	0	0	2	2	0	3	1	

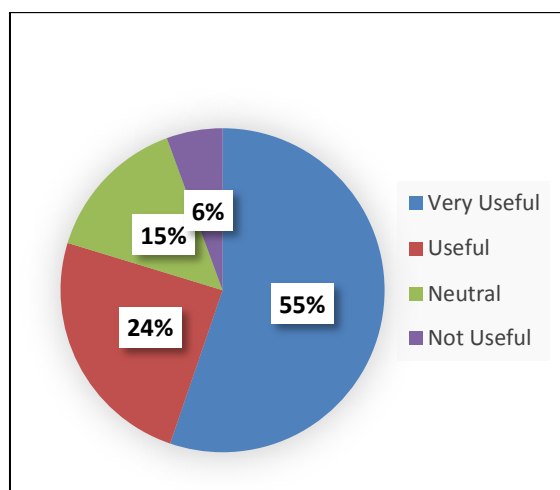


Figure 1-83: Usefulness of the training attended (%)

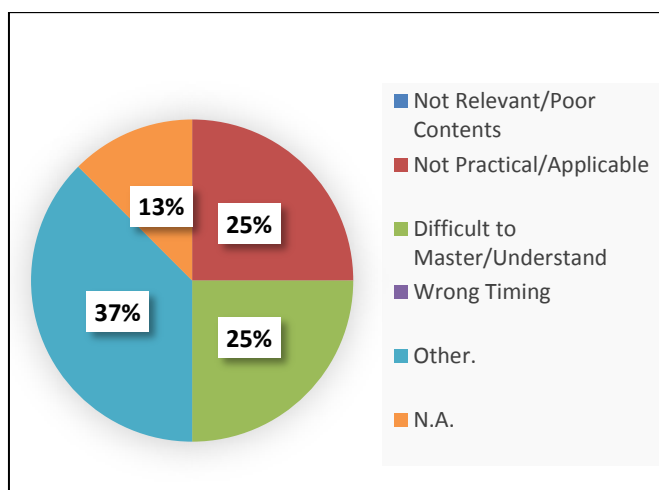


Figure 1-84: Evaluation of Training/Guidance attended (No.)

1.9.2 Requirement of Horticulture Related Training/Guidance

1.9.2.1 Vegetable Related Training/Guidance Requirement

Most required training/guidance was on Nursery Management (74%), Pest & Disease Control (65%) and Planting / Transplanting/Layout (50%).

Table 1-57: Needs assessment of Vegetable Related Training/Guidance Requirement

Subject/ Topics	Need		Needfulness					
	No.	%	Very Much		Needed		If there is Chance	
Nursery Management	137	74%	105	57%	27	15%	5	3%
Pest & Disease Control	119	65%	78	42%	34	18%	7	4%
Planting / Transplanting/Layout	92	50%	70	38%	19	10%	3	2%
Water Management	62	34%	39	21%	19	10%	4	2%
Seed Production	49	27%	26	14%	15	8%	8	4%
Soil Management	47	26%	27	15%	14	8%	6	3%
Wild Animal Control	34	18%	24	13%	8	4%	2	1%
Harvest/Post Harvest	24	13%	16	9%	5	3%	3	2%
Preservation /Processing	20	11%	5	3%	11	6%	4	2%
Marketing	17	9%	10	5%	5	3%	2	1%
Variety and characteristic of Crops	16	9%	10	5%	6	3%	0	0%
Seed Processing/quality manage.	10	5%	4	2%	5	3%	1	1%
Farmer's Group management	9	5%	5	3%	3	2%	1	1%
Other	1	1%	0	0%	1	1%	0	0%
Total	637		419		172		46	

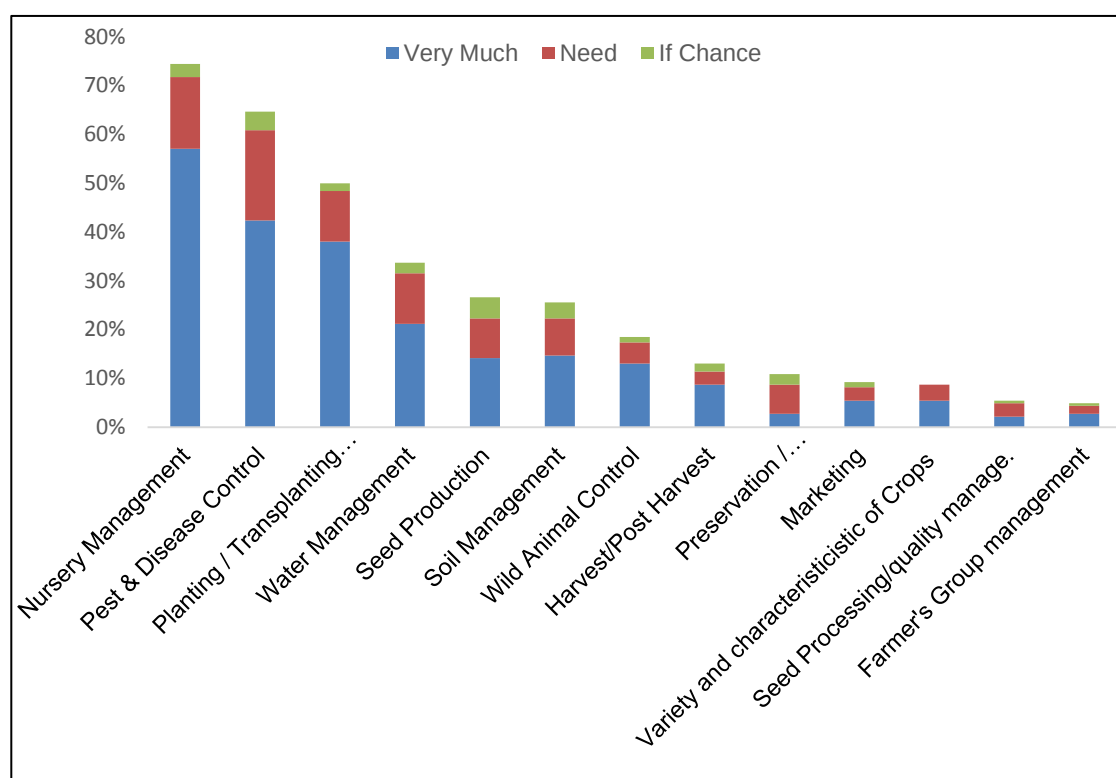


Figure 1-85: The need for Vegetable related training/guidance (%)

Dzongkhag wise, there was not much difference in training needs. “Soil management” training need was relatively high in Punakha and low in Tsirang. “Preservation/Processing” was relatively high in Tsirang and low in Punakha. Training on “Variety and characteristic of Crops” was relatively required high in Wangdue and low in Tsirang. “Seed Processing/quality management” was relatively required high in Tsirang. Dagana farmers required more training/guidance subject (average 4.4 subjects per respondent) compare to other Dzongkhag (Wangdue and Tsirang 3.2 subjects, Punakha was 2.8 subjects)

Table 1-58: Vegetable Related Training/Guidance Requirement in Dzongkhag

Subject/ Topics	Punakha (n42)		Wangdue (n49)		Tsirang (n43)		Dagana (n50)	
Nursery Management	31	74%	36	73%	33	77%	37	74%
Pest & Disease Control	25	60%	29	59%	27	63%	38	76%
Planting / Transplanting/Layout	16	38%	31	63%	17	40%	28	56%
Water Management	9	21%	18	37%	8	19%	27	54%
Seed Production	10	24%	8	16%	13	30%	18	36%
Soil Management	7	17%	21	43%	4	9%	15	30%
Wild Animal Control	9	21%	6	12%	7	16%	12	24%
Harvest/Post Harvest	4	10%	0	0%	6	14%	14	28%
Preservation/Processing	2	5%	0	0%	8	19%	10	20%
Marketing	3	7%	3	6%	3	7%	8	16%
Variety and characteristic of Crops	1	2%	6	12%	1	2%	8	16%
Seed Processing/quality manage.	0	0%	0	0%	8	19%	2	4%
Farmer's Group management	0	0%	1	2%	3	7%	5	10%
Other		0%	0	0%	1	2%	0	0%
Total	117	279%	159	324%	139	323%	222	444%

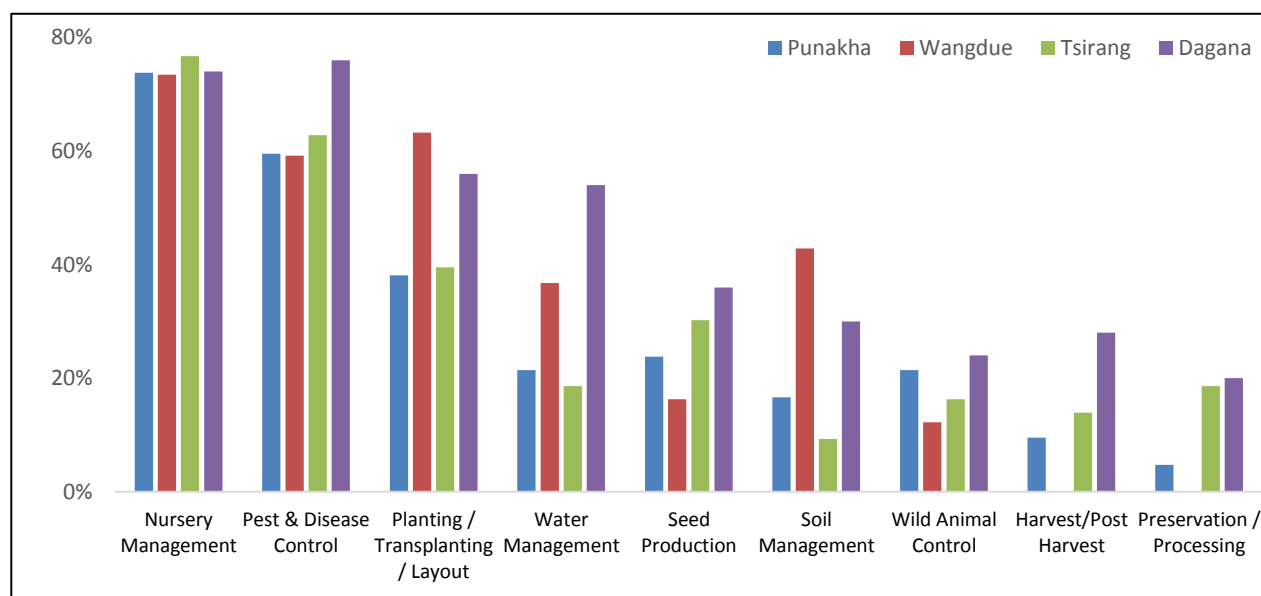


Figure 1-86: Top 9 vegetable related training guidance needs (%) in Dzongkhag

1.9.2.2 Fruit and Nut Related Training/Guidance Requirement

Most required training/guidance was on Tree Management such as Pruning/Training (78%), Grafting/Top-working (70%), and Planting/Transplanting/Layout.

Table 1-59: Needs assessment of Fruit and Nut Related Training/Guidance Requirement

Subject/ Topics	Need		Needfulness					
	No.	%	Very Much		Needed		If there is Chance	
Pruning/Training	143	78%	102	55%	38	21%	3	2%
Grafting/Top-working	128	70%	91	49%	26	14%	11	6%
Planting/Transplanting/Layout	97	53%	81	44%	13	7%	3	2%
Nursery Management	69	38%	62	34%	4	2%	3	2%
Pest & Disease Control	57	31%	36	20%	16	9%	5	3%
Water Management	33	18%	19	10%	9	5%	5	3%
Soil Management	27	15%	18	10%	8	4%	1	1%
Fruit Thinning	19	10%	11	6%	7	4%	1	1%
Wild Animal Control	13	7%	7	4%	4	2%	2	1%
Harvest/Post Harvest	11	6%	6	3%	4	2%	1	1%
Seed Production	9	5%	4	2%	4	2%	1	1%
Marketing	8	4%	3	2%	4	2%	1	1%
Preservation / Processing	8	4%	1	1%	6	3%	1	1%
Farmer's Group management	7	4%	4	2%	3	2%	0	0%
Variety and characteristic of Crops	7	4%	5	3%	2	1%	0	0%
Seed Processing/quality manage.	4	2%	2	1%	1	1%	1	1%
Other	0	0%	0	0%	0	0%	0	0%
Total	640		452		149		39	

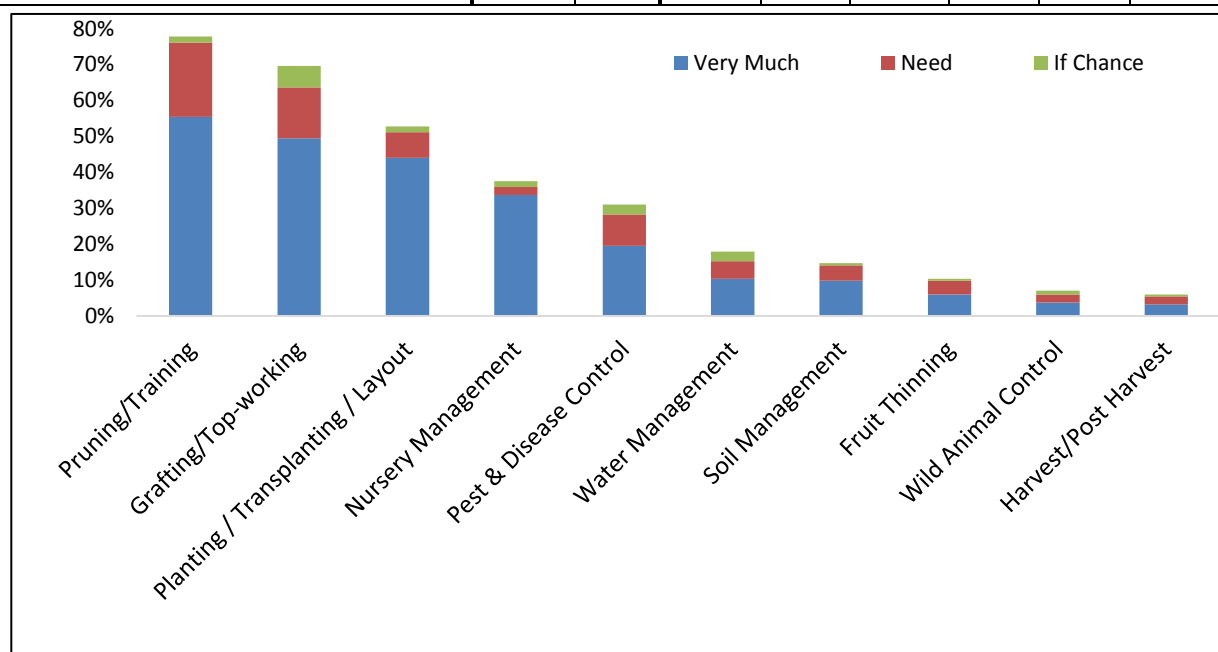


Figure 1-87: Top 10 fruit and nut related training guidance needs (%)

Dzongkhag wise, in general, there was not much difference in need of training priority. “Fruit Thinning” was relatively low in Dagana. “Wild Animal Control” was relatively low in Punakha. Contrary, “Marketing” was relatively high in Wangdue. “Harvest/Post Harvest” relatively high in Tsirang and Wangdue. “Variety and characteristic of Crops” was relatively high in Dagana. The needs were high in Dagana, same as training needs on Vegetable, farmer’s requirement of training is high as almost five (5) subject while same ratio of requirement was found in other Dzongkhag was about three (3) subject.

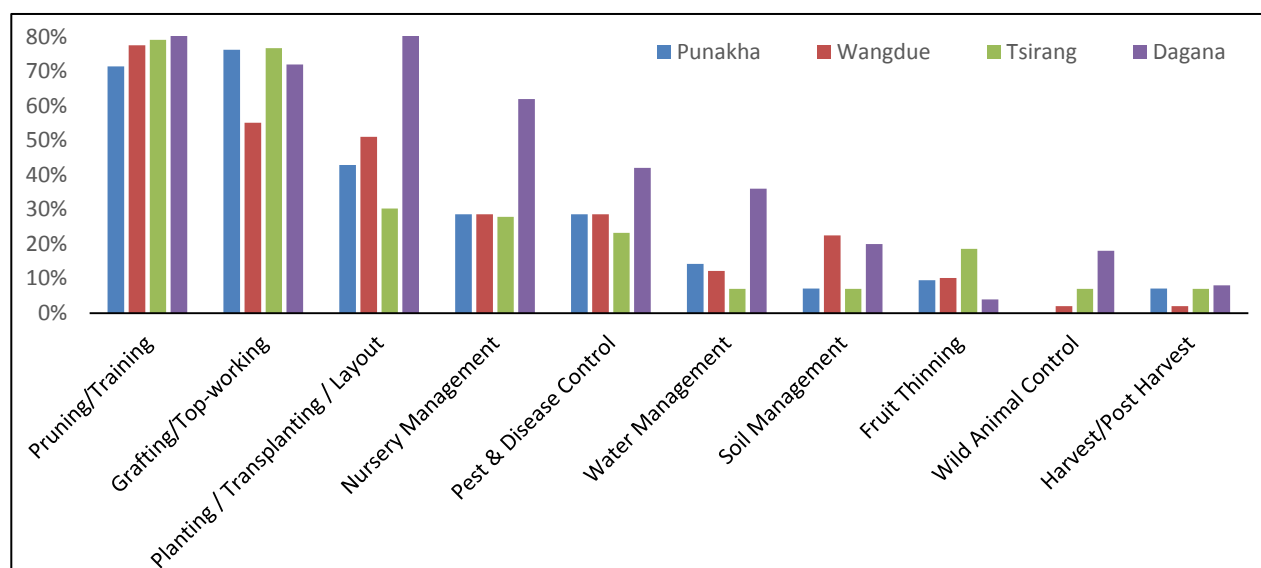


Figure 1-88: Top 10 fruit and nuts related training/Guidance needs in Dzongkhag (%)

Table 1-60: Fruit and Nut Related Training/Guidance Requirement in Dzongkhag

Subject/ Topics	Punakha (n42)		Wangdue (n49)		Tsirang (n43)		Dagana (n50)	
Pruning/Training	30	71%	38	78%	34	79%	41	82%
Grafting/Top-working	32	76%	27	55%	33	77%	36	72%
Planting / Transplanting / Layout	18	43%	25	51%	13	30%	41	82%
Nursery Management	12	29%	14	29%	12	28%	31	62%
Pest & Disease Control	12	29%	14	29%	10	23%	21	42%
Water Management	6	14%	6	12%	3	7%	18	36%
Soil Management	3	7%	11	22%	3	7%	10	20%
Fruit Thinning	4	10%	5	10%	8	19%	2	4%
Wild Animal Control		0%	1	2%	3	7%	9	18%
Harvest/Post Harvest	3	7%	1	2%	3	7%	4	8%
Seed Production	2	5%	1	2%	3	7%	3	6%
Marketing		0%	2	4%	2	5%	4	8%
Preservation / Processing		0%	1	2%	4	9%	3	6%
Farmer's Group management		0%	1	2%	1	2%	5	10%
Variety and characteristic of Crops		0%	1	2%	0	0%	6	12%
Seed Processing/quality manage.	1	2%	0	0%	2	5%	1	2%
Other		0%	0	0%	0	0%	0	0%
Total	123	293%	148	302%	134	312%	235	470%

1.10 Limitation of the study/survey

The figure given by farmers may not be accurate as the interview was based on their memory or recall. Since most of the respondents were illiterate, and no record was found on any of the data collected in this report. The gross underestimate occurred with those respondents, especially who did not sell their agricultural products as valuation of the product was based on their estimate. The actual income and production of the farmers might be higher as farmers have tendency of feeding lower figure and differed with community to community (Village, Gewog). Also, there is possibility of missing record and/or error in unit conversion of land and crop production especially on leaf Vegetable, Grains/Beans by interviewer.

**INTEGRATED HORTICULTURE PROMOTION PROJECT IN THE
WEST CENTRAL REGION (IHPP-JICA/ARDC Bajo)**

SECTION (B)

BASELINE SURVEY REPORT

**Findings at Research Officers and Other Relevant
Agencies Level**

FINDINGS AT RESEARCH OFFICERS AND OTHER RELEVANT AGENCIES LEVEL.

2.1. General Information

The IHPP baseline survey for Research officer included researchers from Agriculture Research and Development Centre (ARDC)-Bajo, Agriculture Research and Development Sub Centre – (ARDSC)-Mithun, Royal project (ADTC)-Chimipang and National Seed Centre (NSC)-Bajo. The information received from the respondents of ARDC-Bajo and ARDSC-Mithun was clubbed together and positioned as ARDC as it is under the same administration. The questionnaire (**Annexure 3**) was developed for both EA and RO and was used for the same. The questionnaire was distributed as hard copy or via email. Of the total 17 expected respondents, 15 responded, which is to about 88%. There was 100% response from NSC-Bajo and ADTC and 83% from ARDC.

2.1.1. Age and Gender

The total 15 number of respondents from ARDC (ARDC-Bajo and ARDSC-Mithun) 10, NSC-Bajo (3) and ADTC (2). The respondents comprised of 12 males (80%) and 3 females (20%). While District Agricultural Sectors officials' average age was 36 years old, the average age of these group was 46 years old varied with the oldest 57 and the youngest 26 years old respectively. The numbers of respondents below the age of thirty were 3 (20%) and 5 (33%) were in between the age of thirty and below forty years while those above the age of forty were 7 (47%).

Table 2-1: Age and gender of the respondents

Respondent	ARDC	NSC Bajo	ADTC	Total
Target No.	12	3	2	17
Response No.	10	3	2	15
Male	8	2	2	12
Female	2	1		3
Ave. Age	46	34	39	
<30	0	2	1	3
31~40	5	0	0	5
>40	5	1	1	7
Max Age	57	42	50	
Min. Age	34	26	27	

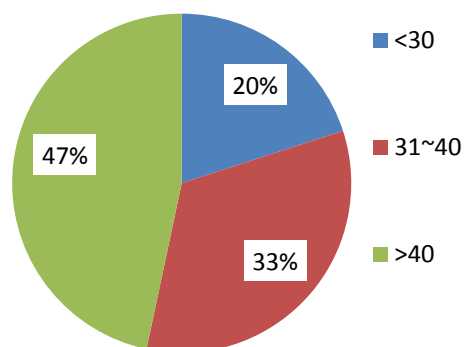


Figure 2-1: Age composition of the respondents

2.1.2. Education level

The academic qualification of the respondents comprised of diploma (n=8, 53%). Bachelor's degree (n=6, 40%) and master's degree (n=1, 7%) were all in ARDC and there were no certificate and Ph.D. holders.

2.1.3. Confidence in horticulture technologies

The three most confident horticulture technologies for researchers in ARDC were fruit and orchard management (100%, n=10), fruit nursery production (90%, n=9), vegetable production (80%, n=8). The least confident fields were irrigation management (10%, n=1), pest and disease control (10%, n=1), soil management (10%, n=1), and marketing (0%, n=0). For officers in NSC-Bajo, the three most confident horticulture technologies were harvest and post-harvest (100%, n=3), preservation and processing (100%, n=3), and vegetable seed production (67%, n=2). The least confident fields were irrigation management, pest and disease control, soil management, and marketing (0%, n=0). No information was available for respondent of ADTC.

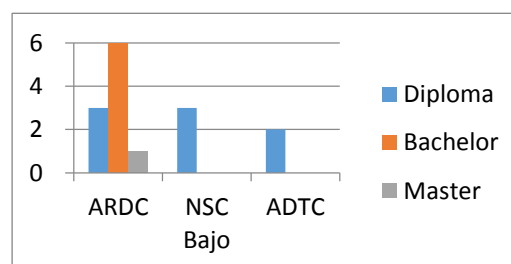


Figure 0-1: Academic qualification of the respondents

Table 2-2: Confidence in horticulture subject area

Horticulture Technologies	ARDC-Bajo		NSC-Bajo	
	No	%	No	%
Fruit Orchard management	10	100%	0	0%
Fruit Nursery production	9	90%	0	0%
Vegetable production	8	80%	1	33%
Vegetable seed production	3	30%	2	67%
Harvest and Post-Harvest	1	10%	3	100%
Preservation, Processing	0	0%	3	100%
Farmer's Group management	2	20%	0	0%
Irrigation Management	1	10%	0	0%
Pest & Disease Control	1	10%	0	0%
Soil Management	1	10%	0	0%

2.1.4. Trainings attended

Table 2-3: Trainings attended by officials

Topic	ARDC		ADTC	
	No	%	No	%
Fruit Orchard management	6	60%	2	100%
Vegetable production	5	50%	2	100%
Vegetable seed production	3	30%	0	0%
Soil Management	3	30%	0	0%
Pest & Disease Control	3	30%	1	50%
Harvest, Post-Harvest	3	30%	1	50%
Farmer's Group management	3	30%	2	100%
Fruit Nursery production	2	20%	2	100%
Irrigation Management	2	20%	1	50%
Preservation, Processing	1	10%	1	50%
Marketing	0	0%	1	50%

Respondents of the NSC-Bajo had not attended any trainings Majority of the respondents from ARDC had attended training on fruit orchard management (60%, n=6) and vegetable production (50%, n=5). Trainings of other horticulture technologies like vegetable seed production, soil management etc. were also attended.

The most attended training by respondents of ADTC were fruit orchard management (100%, n=2), vegetable production (100%, n=2), farmers group management (100%, n=2) and irrigation management (100%, n=2). The respondents of NSC Bajo had not attended any training on horticulture technologies.

2.2. Research/Extension activities

2.2.1. Important issues in vegetable cultivation

The most important issues by multiple selection out of 13 listed issues in vegetable cultivation were knowledge/technical skill of concerned officials (73%, n=11), quality of seeds/seedlings (73%, n=11) and harvest/post-harvest (60%, n=9). The least important issues in vegetable cultivation as per the respondents were farmers group activities (7%, n=1). In the case of ARDC, it was knowledge/technical skill of concerned officials (70%, n=7) and quality of seeds/seedlings (70%, n=7). The least important issue was farm mechanization (20%, n=2) and farmers group activities (0%). The important issues for NSC-Bajo were knowledge/technical skill of concerned officials, quality of seeds/seedlings and preservation/processing (100%, n=3). For ADTC, it was harvest/ post-harvest and pest and disease control (100%, n=2).

Table 2-4: Important issues in vegetable cultivation

Issue	Total		ARDC		NSC-Bajo		ADTC	
	No	%	No	%	No	%	No	%
Knowledge/Technical skill of concerned officials	11	73%	7	70%	3	100%	1	50%
Quality Seed/Seedling	11	73%	7	70%	3	100%	1	50%
Harvest/Post Harvest	9	60%	5	50%	2	67%	2	100%
Pest & Disease Control	7	47%	5	50%		0%	2	100%
Marketing	7	47%	6	60%		0%	1	50%
Soil Management	7	47%	6	60%		0%	1	50%
Preservation/Processing	6	40%	2	20%	3	100%	1	50%
Knowledge/Technical skill of farmers	5	33%	4	40%		0%	1	50%
Improved Variety Crops	3	20%	2	20%		0%	1	50%
Wild Animal Control	4	27%	3	30%		0%	1	50%
Farm Mechanization	2	13%	1	10%		0%	1	50%
Irrigation	4	27%	3	30%		0%	1	50%
Quantity Seed/Seedling	3	20%	2	20%		0%	1	50%
Farmer's Group activities	1	7%	0	0%		0%	1	50%

2.2.2. Important Issues in fruits and nuts cultivation.

Table 2-5: Important issues in fruits and nuts cultivation

Issue	ARDC		ADTC	
	No	%	No	%
Improved Variety Crops	8	80%		0%
Knowledge/Technical skill of concerned officials	7	70%		0%
Knowledge/Technical skill of farmers	5	50%		0%
Quality Seed/Seedling	4	40%		0%
Soil Management	3	30%		0%
Pest & Disease Control	3	30%		0%
Irrigation	3	30%	1	50%
Quantity Seed/Seedling	2	20%		0%
Harvest/Post Harvest	2	20%		0%
Preservation/Processing	2	20%		0%
Farm Mechanization	2	20%		0%
Marketing	1	10%	1	50%
Wild Animal Control	1	10%		0%
Farmer's Group activities	0	0%		0%

There were no issues in fruits and nuts cultivation from respondents of NSC Bajo. In the case of ARDC, the most important issues were improved crop variety (80%, n=8) followed by Knowledge/Technical skill of concerned officials (70%, n=7). The least important issue was farmers group activities (0%, n=0). In the case of ADTC, the most important issue was irrigation (50%, n=1) and marketing (50%, n=1).

2.3. Support to the farmers

2.3.1 Support for Vegetable cultivation

The support provided by the ARDC to the farmers for the promotion of vegetable crops was led by training and guidance (n=8) and followed by seeds and seedlings (n=7). The support provided by the NSC Bajo to the farmers for the promotion of vegetable crops was also in a similar pattern with training and guidance (n=3) and seeds and seedlings (n=3). The support provided by the ADTC was led by training and guidance, seed/seedling, green house/plastic (n=2) and fertilizer (n=2). As per the evaluation of the respondents, the supports were very effective or effective in promoting the vegetable cultivation. A few (n=1) respondent from ARDC were neutral on the effectiveness of training and guidance, and chemical support.

Table 2-6: Support provided for vegetable cultivation

	ARDC				NSC Bajo			ADTC		
	No	Effectiveness			No	Effectiveness		No	Effectiveness	
		Very Effective	Effective	Neutral		Very Effective	Effective		Very Effective	Effective
Training/Guidance	8	2	5	1	3		3	2	1	1
Seed/Seedling	7	2	5		3	1	2	2	0	2
Chemical	3	0	2	1	0	0	0	1	1	0
Green House/Plastic	3	0	3	0	0	0	0	2	1	1
Irrigation Facilities	2	0	2	0	0	0	0	1		1
Fertilizer	1	1	0	0	0	0	0	2	1	1
Machinery/Tool	0	0	0	0	0	0	0	1	1	0

Table 2-7: Support provided for fruits and nuts cultivation

		ARDC		ADTC	
	No	Effectiveness		No	Effectiveness
		Very Effective	Effective		Effective
Training/Guidance	9	3	6	1	1
Seed/Seedling	8	1	7	1	1
Fertilizer	5	1	4	1	1
Chemical	4		4		
Machinery/Tool	3		3	1	1
Green House/Plastic	1		1	1	1
Irrigation Facilities	1		1	1	1

The support provided by the ARDC was led by training and guidance (n=9) and followed by seeds and seedlings (n=8). The support provided by the ADTC was led by seeds and seedlings (n=7) and followed by training and guidance (n=6). As per the evaluation of the respondents the supports were either very effective or effective in promoting fruits and nuts cultivation.

There were no supports provided by NSC Bajo in the promotion of fruits and nuts cultivation.

2.4. Most promoted/potential horticulture crops

2.4.1. Most promoted/potential vegetable crops

Table 2-8: Five most promoted/potential vegetables and reason

	ARDC					NSC Bajo			ADTC	
	%	Reason				%	Reason		%	Reason
		Easy to Cultivate	High Yield	Pest/ Disease Resistance	Easy to Market/sell		Government Policy	Others		
Broccoli	60%	67%	0%	0%	33%	100%	100%	0%	50%	100%
Cauliflower	60%	75%	0%	0%	25%	0%	0%	100%	50%	100%
Cabbage	30%	67%	0%	33%	0%	100%	100%	0%	50%	100%
Radish	30%	100%	0%	0%	0%	100%	100%	0%	0%	0%
Green Bean	20%	0%	0%	0%	100%	100%	100%	0%	0%	0%
Carrot	10%	0%	100%	0%	0%	100%	100%	0%	0%	0%
Chili	10%	100%	0%	0%	0%	0%	0%	0%	100%	100%
Mustard green	20%	50%	0%	0%	50%	0%	0%	0%	0%	0%
Tomato	10%	100%	0%	0%	0%	0%	0%	0%	50%	100%

The max five most promoted vegetables listed by ARDC respondents were broccoli (60%), cauliflower (60%), cabbage (30%), radish (30%) and green bean (20%). The major reason for promoting these vegetables, in general, was 'easy to cultivate' (64%) followed by 'easy to market' (28%). The other reason was 'high yield' (4%), pest/disease resistance' (4%). The same by NSC-Bajo were broccoli, cabbage, radish, green beans and carrot (100%). The main reason for promotion by the NSC Bajo was 'Government

policy' (80%). The reason 'others' (20%) are like availability of seeds. The vegetables promoted by ADTC were chilli (100%), followed by broccoli, cauliflower, cabbage and tomato (50% each). The reason for promotion was 'easy to cultivate' for all the five crops (100%).

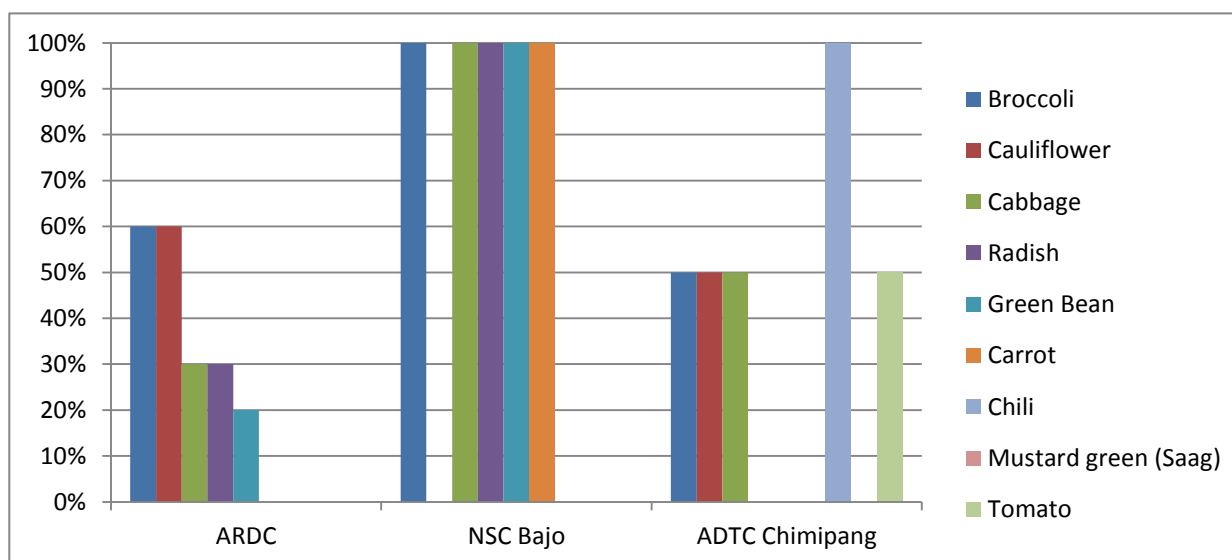


Figure 2-3: Five most promoted vegetables

2.4.2. Most promoted/potential fruit crops

The max five fruits and nuts promoted listed by the ARDC were avocado (80%), pear (70%), peach (60%), persimmon (60%) and soft-shelled walnut (50%). The reasons for promotion were mostly 'easy to cultivate' (50%) and then 'easy to market' (34%), 'competitive advantage' (3%), and 'others' (6%). The fruits and nuts promoted by ADTC were mandarin (n=1) and apple (n=1). The reason for promotion was 'easy to cultivate' (100%). No fruits/nuts were promoted by the NSC-Bajo.

Table 2-9: Most promoted fruits/nuts and reason

	ARDC					ADTC	
	%	Easy to Cultivate	Easy to Market	Competitive advantages	Others	%	Easy to Cultivate
Avocado	80%	50%	50%	0%	0%	0%	0%
Pear	70%	83%	17%	0%	0%	0%	0%
Peach	60%	83%	17%	0%	0%	0%	0%
Persimmon	60%	67%	33%	0%	0%	0%	0%
Soft Shell walnut	50%	40%	20%	0%	40%	0%	0%
Mandarin (Orange)	30%	0%	100%	0%	0%	50%	100%
Apple	0%	0%	0%	0%	0%	50%	100%

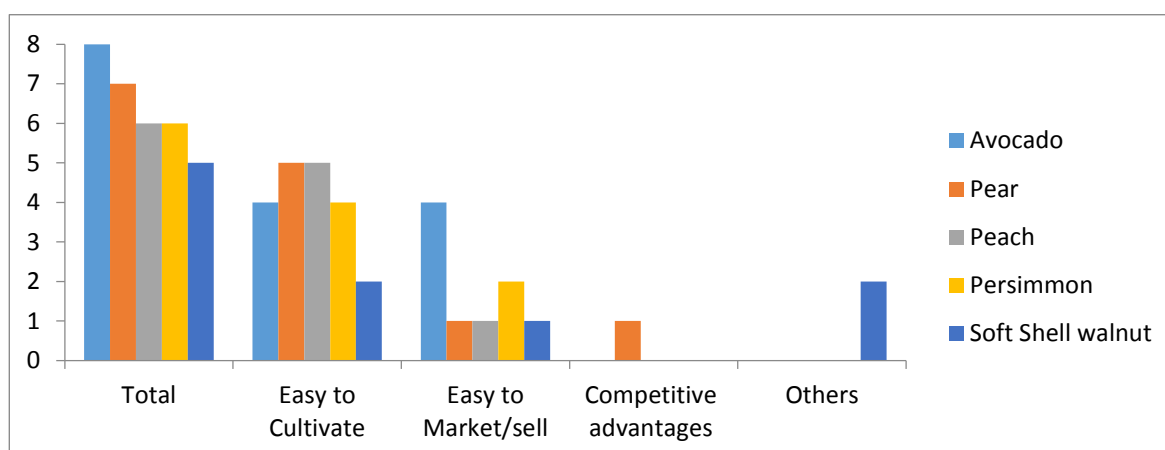


Figure 2-4: Five most promoted fruits and reason

2.5. Most effective horticulture technology promotion approach

Table 2-10: Most effective approach for promotion of horticulture technology

Approaches	ARDC					NSC Bajo			ADTC			
	No	%	Very Effective	Effective	Neutral	No	%	Effective	No	%	Very Effective	Effective
Focus Village/Group	8	80%	12%	88%	0%	3	100%	100%	1	50%	100%	0%
Model Farm by Systematic Training	7	70%	57%	43%	0%	3	100%	100%	2	100%	50%	50%
Integrated Fruits and vegetable development model	6	60%	0%	100%	0%	0	0%	0%	1	50%	0%	100%
Field day / demonstrations	5	50%	0%	80%	20%	3	100%	100%	1	50%	0%	100%
Equal opportunity (Scattered)	3	30%	33%	67%	0%	0	0%	0%	1	50%	100%	0%
Crop competition / displays	1	10%	0%	100%	0%	0	0%	0%	0	0%	0%	0%

The most effective methodology for the promotion of technology as per the respondents from ARDC was focus village/group (80%, n=8), followed by model farm by systematic training (70%, n=7) and integrated fruits and vegetable development model (60%, n=6). The majority of the respondents felt that the approaches would be effective. In the case of NSC-Bajo, the respondents felt that the focus village/group, model farm by systematic training and field day/demonstration would be the most effective technology promotion tool (100%, n=3). Most respondents felt that these technologies would be effective.

The respondents from ADTC felt model farm by systematic training (100%, n=2), followed by focus village/group integrated fruits and vegetable development model, field day/demonstration and equal opportunity (n=1 each) would be the better approaches. Most respondents felt these approaches would be effective.

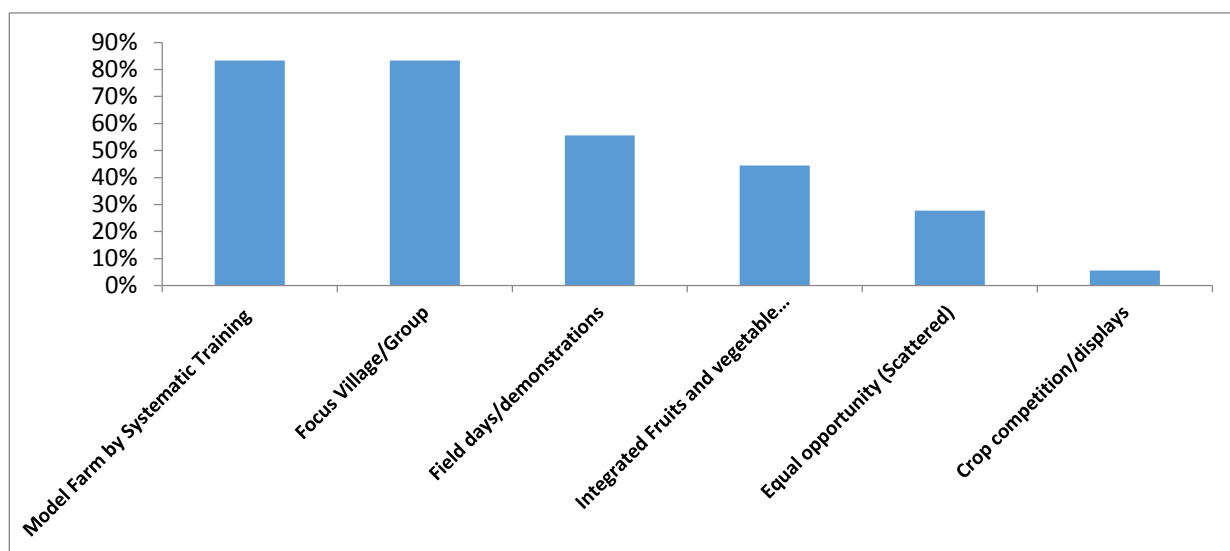


Figure 2-5: Most effective approach in promotion of horticulture technology

2.6. Trainings provided to the farmers

2.6.1. Trainings provided on vegetable cultivation

Most of the respondents of ARDC had provided trainings on nursery management (60%, n=6), planting and transplanting (60%, n=6), pest and disease control (60%, n=6). Less training provided was Water Management (n=1) and Seed Processing/quality management (n=1). All the trainings were provided with both lecture and practical component. Regarding the effectiveness of the training, the respondents felt that the training were all effective except for one in pest and disease control training where respondent had marked neutral. Regarding the confidence in training, all the respondents were confident except for one each in planting/transplanting and pest and disease control training where respondents had marked neutral.

Table 2-11: Trainings provided and self-evaluation on effectiveness and confidence for ARDC Bajo, NSC Bajo and ADTC

ARDC Bajo								
Subject	Provided		Needful	Mode	Effectiveness		Confidence	
	No	%	No	Both	Effective	Neutral	Confident	Neutral
Nursery Management	6	60%	6	6	6	0	6	0
Planting/Transplanting	6	60%	6	6	6	0	5	1
Pest & Disease Control	6	60%	6	6	5	1	5	1
Seed Production	4	40%	4	4	4	0	4	0
Variety & characteristic of Crops	3	30%	3	3	3	0	3	0
Soil Management	2	20%	2	2	2	0	2	0
Harvest/Post Harvest	2	20%	2	2	2	0	2	0
Water Management	1	10%	1	1	1	0	1	0
Seed Proces./quality manage.	1	10%	1	1	1	0	1	0

NSC Bajo								
Subject	Provided		Needful	Mode		Effectiveness	Confidence	
	No	%	No	Knowledge	Both	N.A	Neutral	N.A
Variety & characteristic of Crops	3	100%	3	1	2	3	0	3
Nursery Management	3	100%	3	0	3	3	0	3
Harvest/Post Harvest	3	100%	3	0	3	3	0	3
Seed Production	3	100%	3	0	3	3	0	3
Seed Proces./quality manage.	3	100%	3	0	3	3	0	3

ADTC										
Subject	Provided		Needful	Mode		Effectiveness		Confidence		
	No	%	No	Knowledge	Both	Very Effective	Effective	Very Confident	Confident	Neutral
Nursery Management	2	100%	2	0	2	1	1	2	0	0
Planting/Transplanting	2	100%	2	0	2	1	1	0	2	0
Soil Management	2	100%	2	1	1	0	2	0	2	0
Pest & Disease Control	2	100%	2	1	1	0	2	1	0	1
Variety & characteristic of Crops	1	50%	1	1	0	1	0	0	1	0
Water Management	1	50%	1	1	0	0	1	0	1	0
Wild Animal Control	1	50%	1		1	1	0	0	1	0
Harvest/Post Harvest	1	50%	1	1	0	1	0	1		0
Seed Production	1	50%	1	1	0	0	1	0	1	0
Seed Proces./quality manag.	1	50%	1	1	0	1	0	0	1	1
Food Preserv./Proces.	1	50%	1	1	0	1	0	0	1	0

The respondents from NSC Bajo had provided trainings on variety and characteristic of the crop, nursery management, harvest/ post-harvest, seed production, and seed processing (100%, n=3 each). All the training had both the lecture and practical components except for one on “Variety and characteristic of Crops“ which was solely lectured. There was no-answer provided on the effectiveness and on confidence as per the self-evaluation of the respondents.

Most of the trainings provided by the ADTC were on nursery management, planting/transplanting, soil management, pest and disease control (100%, n=2 each). All the trainings consisted of both lecture and practical mode or lecture alone. The respondents felt that the trainings were very effective and effective. On the subject of training, the respondents were very confident, confident and one respondent as neutral in “Pest & Disease Control”.

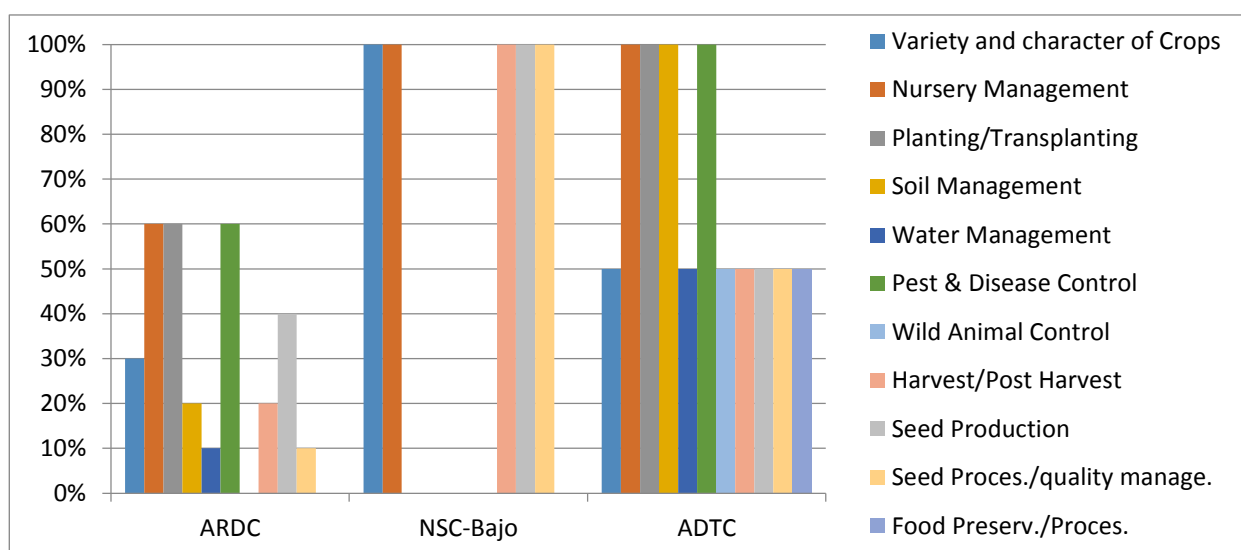


Figure 2-6: Training provided on vegetable cultivation

2.6.2. Trainings provided on fruits and nuts cultivation

Most of the trainings on fruits and nuts provided by respondents from ARDC were pruning/training (90%, n=9) followed by grafting/top working (70 %, n=7), pest and disease control (70%, n=7), nursery management (60 %, n=6), and planting and transplanting (60 %, n=6).

Almost all the trainings had both the lecture and practical component. Regarding the effectiveness of the trainings, all most all the trainings were effective except two (2) in “pest and disease control” and one (1) in “Fruit Thinning” where respondent had marked neutral. And most of the respondents were confident in the training subject except one each in “pest and disease control” and “Fruit Thinning” where respondent had marked neutral.

The trainings provided by the ADTC on fruits and nuts were pruning/training, grafting/top working, fruit thinning, and pest and disease control (n=1 each).

Table 2-12: Training provided on fruits and nuts, effectiveness and confidence

ARDC											
	Provided		Need ful	Training on			Effectiveness			Confidence	
	No	%	No	Knowl edge	Skil l	Both	Very Effective	Effective	Neutral	Confide nt	Neut ral
Pruning/Training	9	90%	9	0	2	7	0	9	0	9	0
Grafting/Top-working	7	70%	7	2	0	5	2	5	0	7	0
Pest & Disease Control	7	70%	7	1	0	6	0	5	2	6	1
Nursery Management	6	60%	5	0	0	6	0	6	0	6	0
Planting/Transplanting	6	60%	6	0	0	6	0	6	0	6	0
Fruit Thinning	3	30%	3	0	0	3	0	2	1	2	1
Harvest/Post Harvest	3	30%	3	0	0	3	0	3	0	3	0
Variety & characteristic of Crops	2	20%	2	0	0	2	0	2	0	2	0
Soil Management	2	20%	2	0	0	2	0	2	0	2	0
Water Management	2	20%	2	0	0	2	0	2	0	2	0
Seed Production	2	20%	2	0	0	2	0	2	0	2	0

ADTC									
	Provided		Needful	Mode		Effectiveness		Confidence	
	No	%	No	Skill	Both	Effective	Neutral	Confident	Neutral
Pruning/Training	1	50%	1	0	1	1	0	1	0
Grafting/Top-working	1	50%	1	0	1	1	0	1	0
Fruit Thinning	1	50%	1	0	1	1	0	1	0
Pest & Disease Control	1	50%	0	1	0	0	1	0	1

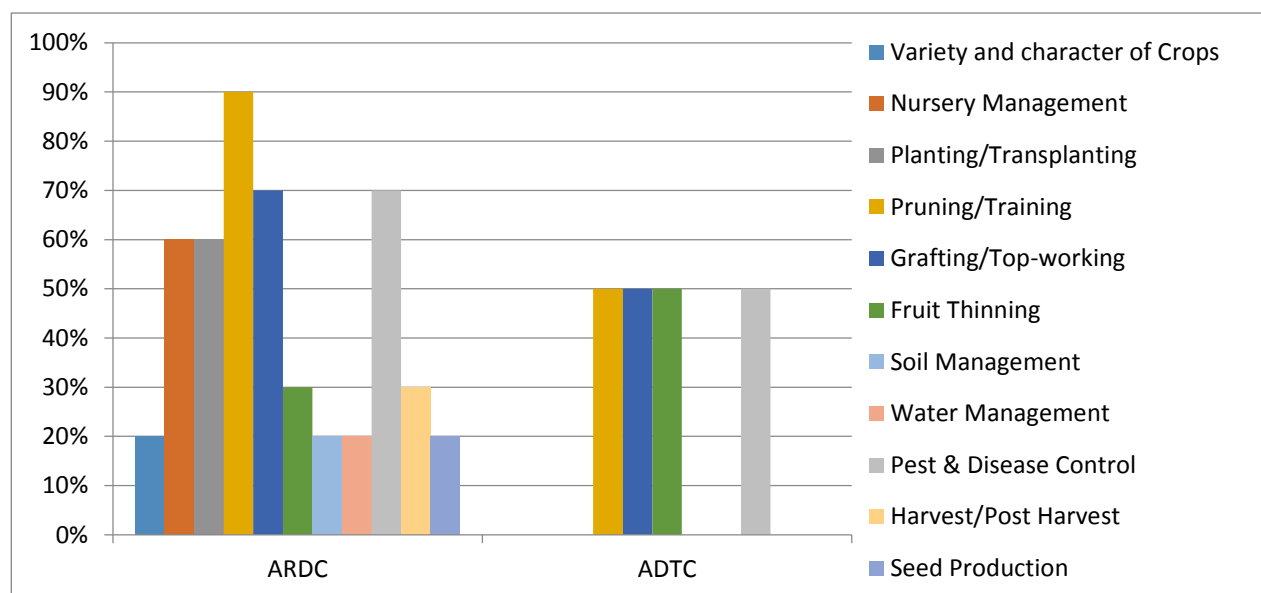


Figure 2-7: Trainings provided on fruits and nuts cultivation

All the trainings were provided both the practical and lecture component except “Pest & Disease Control” was in lecture only. Regarding the effectiveness, most of the trainings were effective with one neutral in “Pest & Disease Control”. The respondents were confident in the subject of the training except one which was neutral in “Pest & Disease Control” again.

2.7. Problems and constraints in implementation of activities

Table 2-13: Problem and constraints in implementation of activities.

Problem/Constraints	Total		ARDC		NSC Bajo		ADTC	
	No	%	No	%	No	%	No	%
Limited Knowledge/Skill	12	80%	10	100%	0	0%	2	100%
Limited Information	10	67%	9	90%	0	0%	1	50%
Limited Equipment/Tools	7	47%	4	40%	2	67%	1	50%
Uncontrollable of Pest/Disease	7	47%	4	40%	2	67%	1	50%
Limited Budget	5	33%	4	40%	0	0%	1	50%
Wild Animal Damage	5	33%	2	20%	2	67%	1	50%
Limited Transportation	5	33%	5	50%	0	0%	0	0%
Limited Materials	4	27%	3	30%	0	0%	1	50%
Limited Man power	4	27%	3	30%	0	0%	1	50%
Water shortage	3	20%	0	0%	2	67%	1	50%
Poor Soil Fertility	2	13%	2	20%	0	0%	0	0%
Natural Hazards	2	13%	0	0%	2	67%	0	0%
Availability of Seed/Seedling	1	7%	1	10%	0	0%	0	0%
Ad-hoc Assignment	1	7%	1	10%	0	0%	0	0%

The major constraints/problem in total were limited knowledge/skill (80%, n=12) followed by limited information (67%, n=10), Limited Equipment/Tools and Uncontrollable of Pest/Disease (47%, 7 each). The least problem/constraints were the availability of seed/seedlings and ad-hoc assignment (7%, n=1 each).

According to the respondents from ARDC were limited knowledge /skill (100%, n=10), limited information (90%, n=9) and limited transportation (50%, n=5).

For the respondents from NSC Bajo was uncontrollable pest/disease, limited equipment/tools, wild animal damage, water shortage, and natural hazards (67%, n=2 each).

The major problem/constraints of the officials in ADTC were limited knowledge/skill (100%, n=2).

2.8. Training needs

2.8.1. Training needs on vegetable cultivation

The most needed training in vegetable cultivation for respondents from ARDC was on variety and characteristic (60%, n=6), followed by pest and disease (40%, n=4), and seed production (40%, n=4). The kind of training required was mostly with both the lecture and practical component. Regarding the needfulness of the training, the respondents evaluated most of the training as 'needed'.

In NSC Bajo was pest and disease, nursery management, soil management, planting/transplanting and harvest/Post harvest (67%, n=2 each). There was no mention of whether the training required should have

practical, lecture or both components. On the needfulness of the training, the respondents evaluated almost of the training as 'needed'.

Same for the ADTC was water management (100%, n=2). According to the respondents most of the training modes required were just lecture only. Regarding the needfulness of the training, it was mostly 'very much needed'.

Table 2-14: Training need on vegetable cultivation

Topic	ARDC				NSC Bajo				ADTC									
	No	Training Mode			Needfulness			No	Trainin g Mode	Needfulnes s		No	Training Mode			Needfulness		
		Knowledge	Skill	Both	Very Much	Needed	If there is Chance			Knowledge	Very Much Needed		Needed	Knowledge	Skill	Both	Very Much Needed	Needed
Variety and characteristic of Crops	6	0	1	5	0	5	1	0	0	0	0	1	0	0	1	0	0	1
Nursery Management	3	0	1	2	0	2	1	2	2	1	1	1	1	0	0	1	0	0
Planting/Transplanting	1	0	0	1	0	1	0	2	2	0	2	1		1	0	1	0	0
Soil Management	3	0	0	3	0	3	0	2	2	0	2	1	1	0	0	1	0	0
Water Management	3	0	0	3	0	2	1	0	0	0		2	1	0	1	1	0	1
Pest & Disease Control	4	0	1	3	0	4	0	2	2	0	2	1	1	0	0	1	0	0
Wild Animal Control	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0
Harvest/Post Harvest	0	0	0	0	0	0	0	2	2	0	2	1	1	0	0	1	0	0
Seed Production	4	1		3	1	2	1	0	0	0	0	0	0	0	0	0	0	0
Seed Proces./quality manage.	3	0	0	3	0	3	0	0	0	0	0	1	0	1	0	0	1	0
Preservation/Processi ng	2	0	0	2	0	2	0	0	0	0	0	1		1	0	1	0	0
Marketing	1	0	0	1	0	1	0	0	0	0	0	1	1	0	0	1	0	0
Farmer's Group Management	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0

2.8.2. Training needs on fruits and nuts cultivation

There were no training needs on fruit and nuts cultivation from the respondent of NSC-Bajo and ADTC.

The most needed training in fruits and nuts cultivation for respondents from ARDC were on variety and characteristic (70%, n=7), followed by pruning and training (60%, n=6), grafting /top working (50%, n=5), pest and disease control (n=5), nursery management, seed processing/quality management, and food preservation and processing (n=4 each). The kind of training required was mostly with both the lecture and practical component. Regarding the needfulness of the training, one each of the respondents evaluated “Very much needed” in Pruning/Training, Water Management and Fruit Thinning while most of the training evaluated as ‘needed’.

Table 2-15: Training needs on fruits and nuts cultivation

Subjects	ARDC						
	Need	Training Mode			Needfulness		
		Knowledge	Skill	Both	Very Much Needed	Needed	If there is Chance
Variety and characteristic	7	1	0	6	0	6	1
Pruning/Training	0	0	0	6	1	5	0
Grafting/Top-working	5	0	0	5	0	4	1
Pest & Disease Control	5	0	2	3	0	5	0
Nursery Management	4	0	0	4	0	3	1
Seed Proces./quality manage.	4	0	0	4	0	3	1
Food Preserv./Proces.	4	0	0	4	0	3	1
Planting/Transplanting	3	0	0	3	0	2	1
Water Management	3	0	0	3	1	2	0
Fruit Thinning	2	0	0	2	1	1	0
Soil Management	2	0	0	2	0	2	0
Harvest/Post Harvest	2	0	0	2	0	2	0
Seed Production	2	0	0	2	0	1	1
Marketing	1	0	0	1	0	1	0

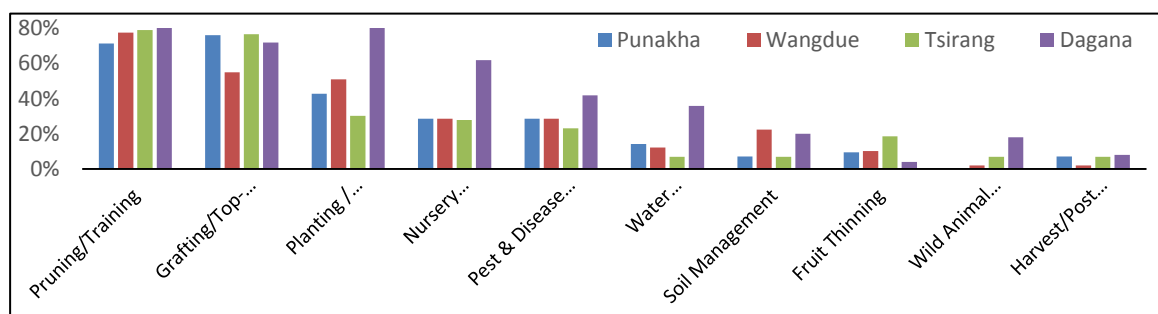


Figure 2-8: Top 10 Fruit and Nut Related Training/Guidance Needs

2.9. Expectation from IHPP-JICA/Bajo

The kind of technical support/training/guidance expected from the IHPP-JICA was also gathered to guide the project in designing the kind of training/support to be extended to the researchers and officials in NSC. Following were the expectation of the respondents.

2.9.1. Expectation of respondents from ARDC

- Hands on training on fruits and vegetable production (n=4).
- Knowledge and skill up gradation in horticulture crops (n=1).

2.9.2. Expectation of respondents from NSC Bajo

- Training on seed production and processing (N=2,).
- Training on walnut scion wood preparation and grafting (n=1).

**INTEGRATED HORTICULTURE PROMOTION PROJECT IN THE
WEST CENTRAL REGION**

(IHPP-JICA/ARDC Bajo)

SECTION (C)

BASELINE SURVEY REPORT

Findings at Dzongkhag/Gewog Extension Level

FINDINGS AT DZONGKHAG/GEWOG EXTENSION LEVEL

The IHPP baseline survey included the District Agriculture Officer (DAO) and the Agriculture Extension Officers (AEO) of five districts under the west central region namely Punakha, Wangdue Phodrang, Tsirang, Dagana and Gasa. A separate questionnaire was prepared (**Annexure 3**) and distributed as hard copy or via email. Of the total 61 expected respondents, only 43 responded which included both DAOs and AEOs in the Dzongkhags. Lowest % respondent was from Dagana where only 56% of the total officers responded. The respondent % from Tsirang was 64%, from Punakha and Wangdue it was 70% and from Gasa Dzongkhag, it was 100%.

3.1. Personal Information

3.1.1. Age and Gender

Table 3-1: Age, age composition and gender of the respondents

Respondent	Punakha	Wangdue	Tsirang	Dagana	Gasa	Total
Male	6	6	9	9	3	33
Female	4	6	0	0	0	10
<30	5	2	1	3	1	12
31~40	3	7	4	3	1	18
>40	2	3	4	3	1	13
Max Age	50	45	53	56	54	
Min. Age	23	27	24	26	27	
Average age	33	36	40	37	39	

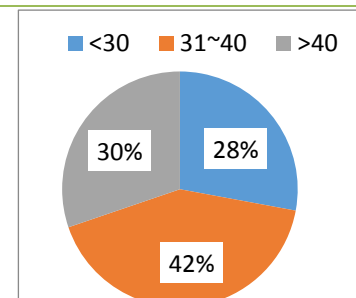


Figure 3-1: Age gender composition

Of the 43 respondents, 10 were female and 33 were male. The average age of the respondent was 36 years and the youngest respondent was 23 years old while the oldest respondent was 56 years old. As indicated in the figure 3-1, the 28% of the respondents was under the age of 30, 42% were in the age range of 31-40 years and 30% of the respondents were older than 40 years. The average age of the extension personnel of the five districts were more or less same with Punakha having the lowest with 33 years and Tsirang with the oldest average age of 40 years.

3.1.2. Education Level

The academic qualification of the respondents comprised of the certificate (n=1), diploma (n=23), bachelor's degree (n=19). There were no master's degree and PhD holders. Dzongkhag wise, Wangdue had higher number of bachelor holders (66%) while Dagana and Tsirang had less (22% and 33%).

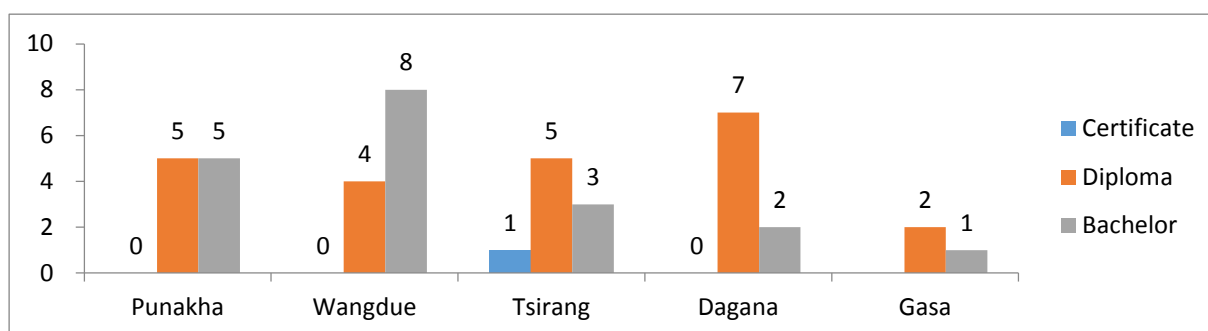


Figure 3-2: Academic qualification of the respondents

3.1.3. Confidence in horticulture technologies

Table 3-2: Confidence in horticulture subject area

Horticulture Technologies	Total		Punakha		Wangdue		Tsirang		Dagana		Gasa	
	No	%	No	%	No	%	No	%	No	%	No	%
Vegetable production	34	79%	8	80%	11	92%	7	78%	5	56%	3	100%
Fruit orchard management	23	53%	4	40%	5	42%	7	78%	6	67%	1	33%
Pest and Disease Control	16	37%	2	20%	6	50%	3	33%	5	56%	0	0%
Soil Management	10	23%	2	20%	4	33%	1	11%	3	33%	0	0%
Farmer's Group management	8	19%	0	0%	5	42%	3	33%	0	0%	0	0%
Fruit Nursery production	4	9%	0	0%	1	8%	1	11%	2	22%	0	0%
Irrigation Management	3	7%	1	10%	1	8%	1	11%	0	0%	0	0%
Harvest, Post-Harvest	2	5%	0	0%	1	8%	0	0%	1	11%	0	0%
Preservation, Processing	2	5%	0	0%	0	0%	0	0%	2	22%	0	0%
Vegetable seed production	1	2%	0	0%	0	0%	1	11%	0	0%	0	0%
Marketing	1	2%	0	0%	0	0%	0	0%	0	0%	1	33%

The three most confident area of horticulture technologies were vegetable production (79%, n=34), fruit orchard management (53%, n=23), and pest and disease (37%, n=16). The trend was similar for Wangdue Phodrang, Punakha, Tsirang and Dagana Dzongkhags. For the respondents of Gasa Dzongkhag, the most confident field was vegetable production (100%, n=3), followed by fruit orchard management (33%, n=1) and marketing (33%, n=1). None of respondent committed their confident in harvest and post-harvest, preservation and processing, and vegetable seed production (0%, n=0).

3.1.4. Training attended by the extension personnel

The most attended training was on vegetable production (58 %, n=25) followed by fruit orchard management (40%, n=17), pest and disease control (30%, n=13), farmers group management (21%, n=9), soil management (21%, n=9), harvest and post-harvest (12%, n=5), irrigation management (9%, n=4), marketing (7%, n=3), fruit nursery production (5%, n=2), preservation and processing (5%, n=2), vegetable seed production (2%, n=1) and others (2%, n=1). The majority of the trainings comprised of both lecture and practical.

For Tsirang Dzongkhag, the most attended training was on vegetable production (33%), fruit orchard management (33%) and pest and disease control (22%). For Dagana Dzongkhag, it was also on fruit orchard management (56%), pest and disease control (56%) and vegetable production (44%). For Punakha Dzongkhag, it was on vegetable production (80%), fruit orchard management (30%) and pest and disease control (20%). For Wangdue Phodrang Dzongkhag, the most attended training was on vegetable production (58%), fruit orchard management (50%), pest and disease control (33%) and soil management (33%). For Gasa Dzongkhag, it was vegetable production (100%), marketing (67%), farmer's group management (33%), and harvest and post-harvest (33%).

92 % of attended training was in-country and 4% in India. The terms of mode of training, 69% was lecture & practical, 21% was lecture and only 10% was practical.

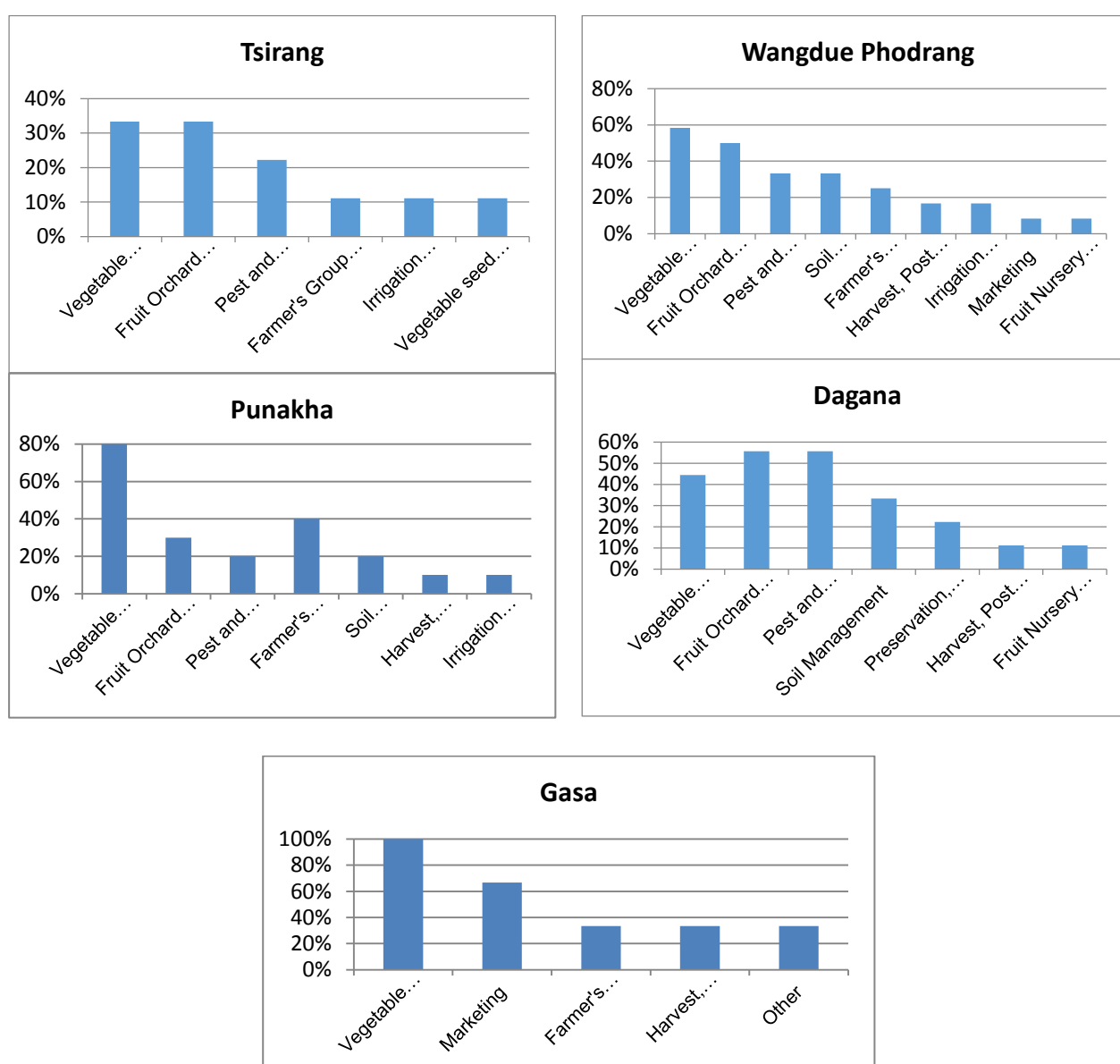


Figure 3-3: Trainings attended by extension personnel of west central Dzongkhags

Table 3-3: Trainings attended by the extension personal

Topics	Total									
	Total	%	Place					Training Mode		
			In-Country	India	Japan	Other (Asia)	Other	Lecture	Practical	Lecture & Practical
Vegetable production	25	58%	21	4	0	0	0	8	2	15
Fruit Orchard management	17	40%	17	0	0	0	0	1	2	14
Pest and Disease Control	13	30%	13	0	0	0	0	5	1	7
Farmer's Group management	9	21%	9	0	0	0	0	1	1	7
Soil Management	9	21%	9	0	0	0	0	0	1	8
Harvest, Post-Harvest	5	12%	5	0	0	0	0	2	0	3
Irrigation Management	4	9%	4	0	0	0	0	1	0	3
Marketing	3	7%	2	0	1	0	0	0	1	2
Fruit Nursery production	2	5%	2	0	0	0	0	0	1	1
Preservation, Processing	2	5%	2	0	0	0	0	0	0	2
Vegetable seed production	1	2%	0	0	0	0	1	0	0	1
Other	1	2%	0	0	0	1	0	1	0	0
Total	91		84	4	1	1	1	19	9	63
			92%	4%	1%	1%	1%	21%	10%	69%

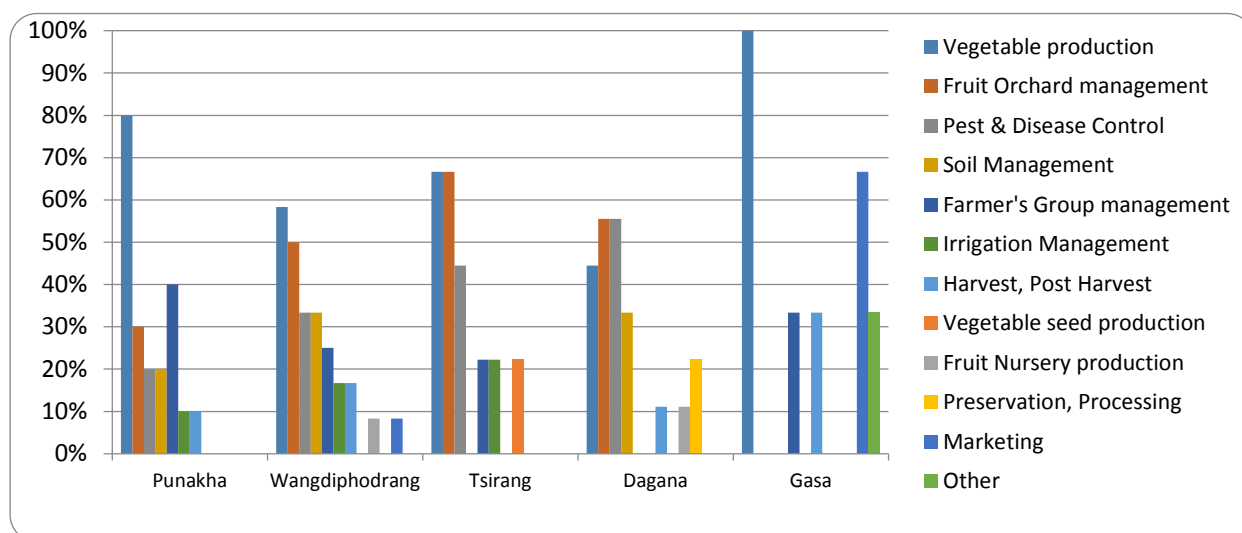


Figure 3-4: Trainings attended by extension personnel (Dzongkhag wise)

In Punakha Dzongkhag, 80% of the extension personals have attended vegetable cultivation training. Likewise, 30% on fruit orchard management, 20% on pest & disease and on soil management, 40 % on farmer's group management, 10% on irrigation management, and harvest/post-harvest trainings respectively. In Wangdue Phodrang Dzongkhag 58% of them have attended vegetable cultivation, and fruit orchard management (50%), pest and disease (33%), soil management (33%), farmer's group management (25%), irrigation management (17%), and harvest and post-harvest (17%), fruit nursery production (8%) and marketing trainings (8%). In the case of Tsirang Dzongkhag, 76% have attended vegetable cultivation, and fruit orchard management (67%), irrigation management (44%), and vegetable seed production trainings (22%). In the case of Dagana Dzongkhag 44%, have attended vegetable cultivation and fruit orchard management (56%), pest and disease (56%), soil management (33%), harvest and post-harvest (11%), fruit nursery production (11%), and preservation and processing training (22%).

In Gasa Dzongkhag, 100%, have attended vegetable cultivation (100%) and farmer's group management (33%), harvest and post-harvest (33%), marketing (67%) and other trainings (33%).

3.2. Research/Extension activities

3.2.1. Important Issues

3.2.1.1. Important issues in vegetable cultivation

The most important issue in vegetables cultivation in general for west central region districts was knowledge/technical skill of concerned officials (95%, n=41), followed by quality seed/seedling (88%, n=38), knowledge/technical skill of farmers (86%, n=37), pest and disease control (79%, n=34), irrigation (77%, n=33), improved crop variety (70%, n=30) etc. as indicated in the table below. The least important issues were quality seed/seedling (51%, n=22) and preservation/processing (51%, n=22). On the degree of the importance of the issues, 59% of the issues were rated as the 'most important', 31% as 'very important and 10 % as important issues by the respondents.

For Punakha Dzongkhag, the most important issue was quality seed and seedlings (100%), followed by knowledge and technical skill of the concerned official and farmer (90%). The least important issue was wild animal control (60%) and quality seed seedling (60%). For Wangdue Phodrang Dzongkhag, the most important issue was knowledge and technical skill of the concerned official and farmer (100%) followed by quality seed and seedling (83%), pest and disease control (83%), and irrigation (83%). The least important issues in vegetable cultivation was quantity seed/seedling (42%), and preservation and processing (42%).

In the case of Tsirang Dzongkhag, the most important issue was knowledge and technical skill of the concerned farmer (100%) and knowledge and technical skill of the concerned officials (89%). The least important issues in vegetable cultivation was preservation/processing (44%).

Table 3-4: Important issues in vegetable cultivation

Issue	Total	%	Importance		
			Most important	Very impotent	Important
Knowledge/Technical skill of concerned officials	41	95%	33	8	0
Quality Seed/Seedling	38	88%	29	8	1
Knowledge/Technical skill of farmers	37	86%	23	9	5
Pest and disease Control	34	79%	20	12	3
Irrigation	33	77%	22	10	1
Improved Crop Variety	30	70%	17	11	2
Marketing	29	67%	16	11	2
Farmer's Group activities	28	65%	12	8	8
Farm Mechanization	27	63%	9	12	6
Harvest/Post Harvest	27	63%	13	10	4
Soil Management	26	60%	16	6	4
Wild Animal Control	25	58%	15	8	2
Quantity Seed/Seedling	22	51%	15	5	2
Preservation/Processing	22	51%	7	11	4
			59%	31%	10%

Knowledge and technical skill of the concerned farmer (100%), and pest and disease control (100%) were the most important issues related to vegetable cultivation for Dagana Dzongkhag. The least important issues were wild animal control (44%), quantity seed/ seedling (44%), and preservation/ processing (44%).

Gasa Dzongkhag had fewer issues and the most important issues were knowledge and technical skill of the concerned farmer (100%), quality seed/ seedling (100%) and harvest and post-harvest (100%). The least important issues were farmers group activities (33%), farm mechanization (33%) and soil management (33%).

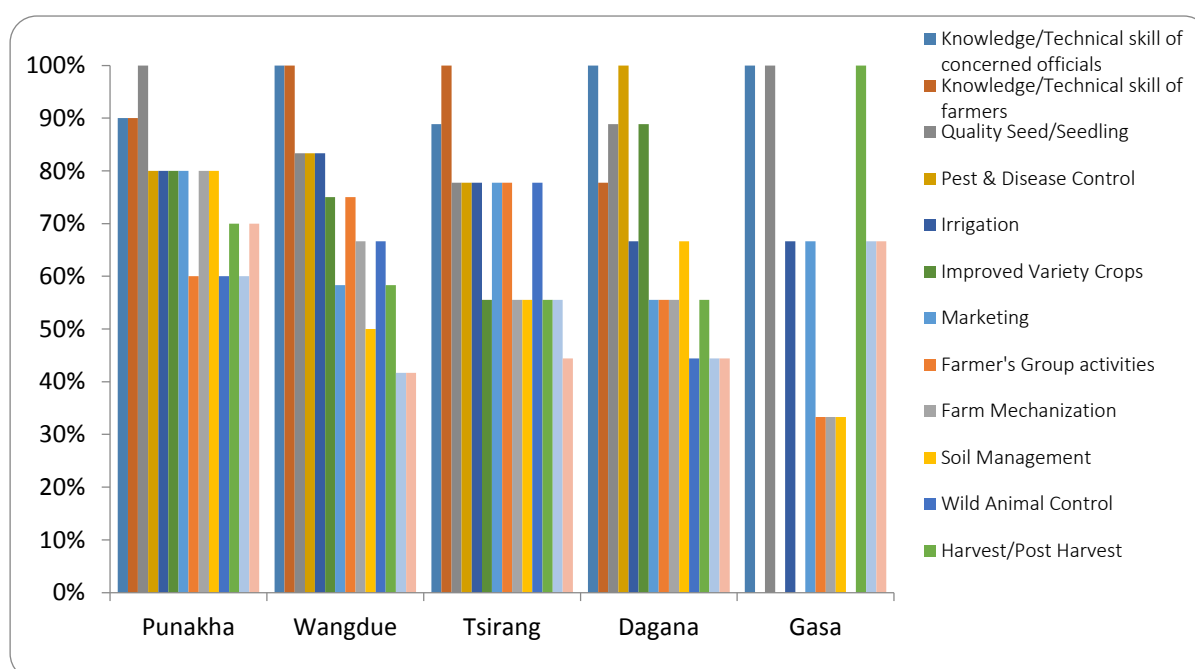


Figure 3-5: Dzongkhag wise issues in vegetable cultivation (%)

3.2.1.2. Important issues in fruits and nuts cultivation

The most important issues in fruit and nuts cultivation was knowledge/technical skill of concerned officials (70%, n=30), followed by pest and disease control (67%, n=29), knowledge or technical skills of farmers (65%, n=28), quality seeds/ seedlings (63%, n=27), soil management (60%, n=26). The least important issues were farmers group activities (30%, n=13) and farm mechanization (33%, n=14). However, the respondents from Gasa Dzongkhags had not responded on the fruits and nuts cultivation issue and thus there were no issues reflected for Gasa Dzongkhag.

On the degree of the importance of the issues, 62% of the issues were rated as the 'most important', 28% as very important and 10% as important by the respondents.

Table 3-5: Important issues in fruits and nuts cultivation

Issues	Total	%	Importance		
			Most important	Very important	Important
Knowledge/Technical skill of concerned officials	30	70%	24	6	0
Pest & Disease Control	29	67%	17	7	5
Knowledge/Technical skill of farmers	28	65%	18	7	3
Quality Seed/Seedling	27	63%	20	6	1
Soil Management	26	60%	15	9	2
Improved Variety Crops	24	56%	16	5	3
Irrigation	23	53%	15	6	2
Wild Animal Control	21	49%	10	8	3
Quantity Seed/Seedling	20	47%	14	6	0
Preservation/Processing	20	47%	13	5	2
Marketing	20	47%	15	4	1
Harvest/Post Harvest	19	44%	7	10	2
Farm Mechanization	14	33%	7	6	1
Farmer's Group activities	13	30%	3	4	6
			62%	28%	10%

For Punakha Dzongkhag, the most important issue was the lack of improved crop variety (70%) and the least important issues were wild animal control (40%) and farmer's group activities (40%). In the case of Wangdue Dzongkhag, the most important issue was soil management (75%). The least important issues were marketing (33%), irrigation (33%) and harvest/ post-harvest (33%). There were no issues for farmers' group activity. The knowledge and technical skills of the farmers (100%) was the most important issue for Tsirang Dzongkhag for fruits and nuts cultivation. The least important issue was quality seed/seedling (33%).

For Dagana Dzongkhag, the most important issue was knowledge/ technical skills of concerned officials (100%). The least important issues were preservation/ processing (44%), wild animal control (44%), farmer's group management (44%) and quantity seeds and seedlings (44%). There were no issues for farm mechanization.

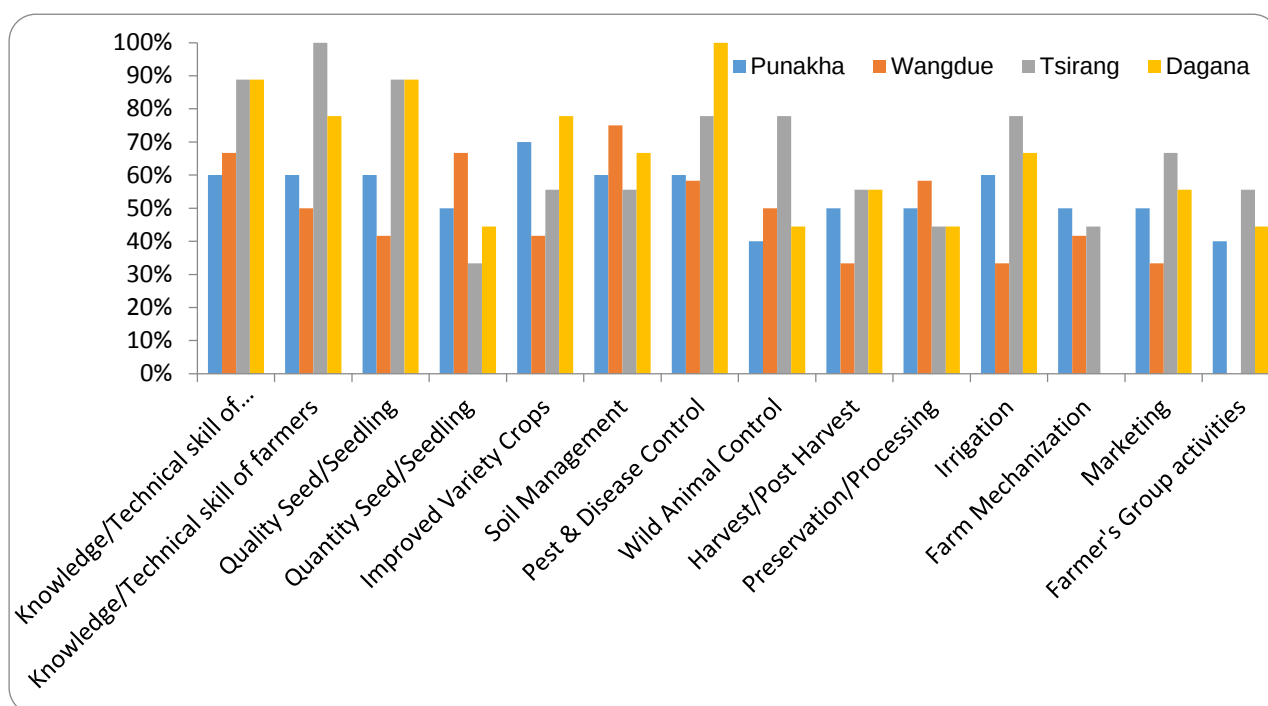


Figure 3-6: Dzongkhag wise issues in fruits and nuts cultivation (%)

3.2.2. Support provided to the farmers

The supports for the promotion of horticulture crops are being provided by the Dzongkhag Agriculture Sector. This information was gathered to know what all supports were provided and also the effectiveness of the supports.

3.2.2.1 Support provided for vegetable promotion

The supports provided to the farmers by the District Agriculture Office was topped by the training and guidance (93%, n=40), and followed by seed/seedling (79%, n=34), and greenhouse/plastic (63%, n=27). The least support provided was fund (2%, n=1).

On the self-evaluation on the effectiveness of the support in promoting the vegetable cultivation, 21% of the respondents have rated the supports to be very effective, 20% as effective and 4% as neutral on average. Two supports (which included one training and one greenhouse plastic each) were found to be not practical/ applicable.

On the Dzongkhag wise support for vegetable promotion, Punakha Dzongkhag's support was topped by seed/seedlings (100%), training/guidance (90%) and green house/ poly plastic (80%). The least support provided was fund (10%). And no fertilizer and electric fence supports were provided.

For Wangdue Dzongkhag, the most support provided was seed/seedlings (100%), training/guidance (92%) and green house/ poly plastic (89%). The least support provided was electric fence (33%) and fertilizers (33%). No fund support was provided.

Table 3-6: Supports provided for vegetable promotion

Support Provided	No.	%	Effectiveness					Reason Not Practical/ Applicable
			Very Effective	Effective	Neutral	Not Effective	N.A	
			%	%	%	%	%	
Training/Guidance	40	93%	51%	37%	2%	2%	0%	1
Seed/Seedling	34	79%	37%	37%	5%	0%	0%	0
Green House/Plastic	27	63%	21%	35%	5%	2%	0%	1
Chemical	21	49%	16%	16%	14%	0%	2%	0
Irrigation Facilities	17	40%	19%	21%	0%	0%	0%	0
Machinery/Tool	17	40%	21%	16%	2%	0%	0%	0
Electric Fence	9	21%	14%	5%	2%	0%	0%	0
Fertilizer	8	19%	5%	9%	2%	0%	2%	0
Fund	1	2%	2%	0%	0%	0%	0%	0
Average effectiveness %			21%	20%	4%	0%	0%	

In the case of Tsirang Dzongkhag, seed and seedling (100%) and green house/ poly plastic (100%) topped the support. In Dagana Dzongkhag too, the least support provided was electric fence (33%) and fertilizers (33%). No fund support was provided.

Gasa Dzongkhag's support was led by seed/seedlings (100%), training/guidance (100%), green house/ poly plastic (100%), Irrigation facilities (100%) and electric fence (100%). No fund and fertilizer support was provided.

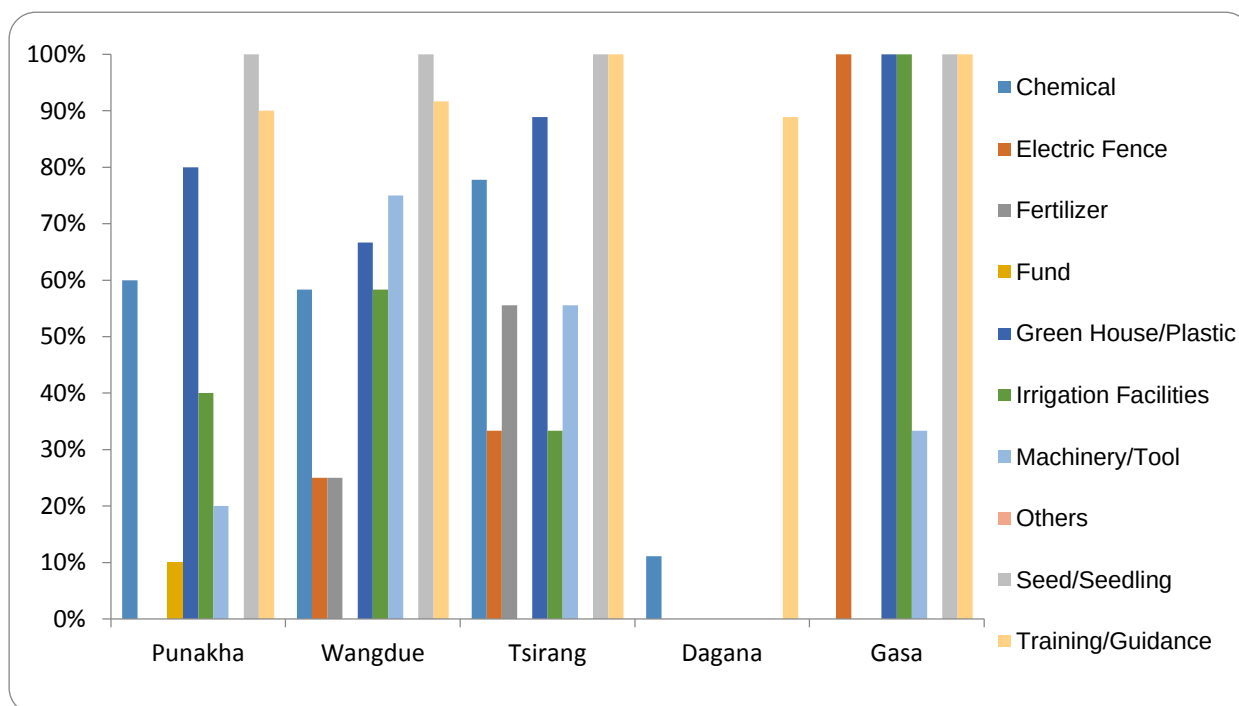


Figure 3-7: Dzongkhag wise support provided for vegetable promotion (%)

3.2.2.2 Support provided for fruits and nuts promotion

Table 3-7: Support provided for fruits and nuts promotion

Support Provided	No.	%	Effectiveness					V. Effectiveness + Effective
			Very Effective	Effective	Neutral	Not Effective	N.A	
Training/Guidance	28	65%	30%	26%	0%	5%	0%	56%
Seed/Seedling	19	44%	19%	16%	5%	0%	0%	35%
Electric Fence	12	28%	16%	5%	7%	0%	0%	21%
Irrigation Facilities	12	28%	12%	9%	5%	0%	2%	21%
Chemical	8	19%	0%	14%	2%	0%	2%	14%
Fund	7	16%	14%	0%	2%	0%	0%	14%
Machinery/Tool	7	16%	2%	9%	0%	2%	2%	11%
Green House/Plastic	4	9%	2%	2%	2%	0%	2%	4%
Fertilizer	1	2%	0%	2%	0%	0%	0%	2%
Average effectiveness %			11%	9%	3%	1%	1%	

The support provided by the District Agriculture Office for the promotion of fruits and nuts was led by the training and guidance (65%, n=28) and followed by seed/seedling (44%, n=19). The least supports provided were greenhouse/poly plastic (9%, n=4) and fertilizer (2%, n=1). On the self-evaluation on the effectiveness, 11% evaluated that the supports provided were very effective, 9% as effective, 3% as neutral, 1% as not effective and 1% had not evaluated at all. The reason for non-effectiveness of the supports were the supports were not applicable/ practical (n=1) and others (n=1). The effectiveness of the supports provided in descending order were training/guidance 56%, seed/seedling (35%), electric fence (21%), irrigation facilities (21%), chemical (14%), fund (14%), machinery/tools (11%), green house/ poly plastic (4%), and fertilizer (2%) with combined percentage of very effective and effective (self-evaluation of the respondent). For Punakha Dzongkhag, the most support provided to the farmers was seed/seedling (90%)

and training guidance (80%). The least supports provided were an electric fence (10%), machinery/tool (10%) and fund (10%). No fertilizer support was provided.

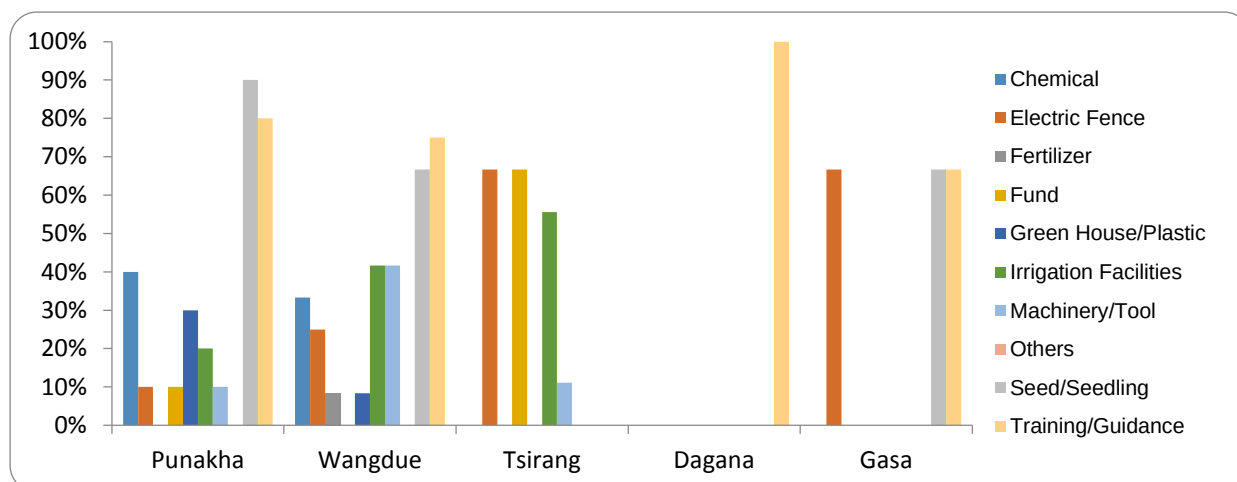


Figure 3-8: Dzongkhag wise support provided for fruits and nuts promotion

For Wangdue Dzongkhag, training and guidance (75%) topped the support list followed by seed/seedling (67%). The least supports provided were green house/poly plastic (8%) and fertilizer (8%). No fund support was provided. In the case of Tsirang Dzongkhag, the maximum support provided was an electric fence (67%), irrigation facilities (56%) and fund (67%). The least support provided was machinery/tool (11%). No other supports were provided. Only training/guidance (100%) was provided by the DAS of Dagana Dzongkhag. No other supports were provided as per the respondents. For Gasa Dzongkhag, seed/seedling (67%), training guidance (67%) and electric fence (67%) supports were provided. No other supports were provided otherwise.

3. 2.3. Most promoted/potential horticulture crops

3. 2.3.1. Most promoted/potential vegetable crops

The five most promoted vegetable crops were cabbage (63%, n=27), green bean (40%, n=17), bulb onion (35%, n=15), broccoli (33%, n=14) and cauliflower (33%, n=14). The reasons for the promotion of these crops were high yield (16%), easiness in cultivation (13%), easy to market (9%) and government policy (1%).

Table 3-8: Top five promoted vegetable crops

SN	Crops	Total		Reasons for promotion				
		No	%	Easy to Cultivate	High Yield	Pest/ Disease Resistance	Easy to Market	Government Policy
1	Cabbage	27	63%	35%	16%	2%	7%	2%
2	Green Bean	17	40%	12%	16%	0%	9%	2%
3	Bulb Onion	15	35%	5%	14%	0%	14%	2%
4	Broccoli	14	33%	7%	14%	0%	12%	0%
5	Cauliflower	14	33%	9%	19%	0%	5%	0%
Average reason for promotion (%)				13%	16%	0%	9%	1%

The top five most promoted vegetable for Punakha Dzongkhag were green bean (60%, n=6), cabbage (50%, n=5), broccoli (40%, n=4), chilli (40%, n=4) and tomato (40%, n=4).

Table 3-9: Dzongkhag wise top five most promoted vegetable crops

Dzongkhag	Five most promoted vegetable crops		
Punakha	1	Green bean	(60%, n=6)
	2	Cabbage	(50%, n=5)
	3	Broccoli	(40%, n=4)
	4	Chilli	(40%, n=4)
	5	Tomato	(40%, n=4)
Wangdue	1	Cabbage	(58%, n=7)
	2	Chilli	(58%, n=7)
	3	Carrot	(42%, n=5)
	4	Mustard green	(42%, n=5)
	5	Tomato	(33%, n=4)
Tsirang	1	Bulb onion	(89%, n=8)
	2	Cabbage	(78%, n=7)
	3	Green bean	(67%, n=6)
	4	Ginger	(67%, n=6)
	5	Broccoli	(56%, n=5)
Dagana	1	Cabbage	(89%, n=8)
	2	Cauliflower	(56%, n=5)
	3	Radish	(44%, n=4)
	4	Green bean	(33%, n=3)
	5	Broccoli	(22%, n=2)
Gasa	1	Broccoli	(100%, n=3)
	2	Bulb onion	(100%, n=3)
	3	Cabbage	(67%, n=2)
	4	Green bean	(67%, n=2)
	5	Radish	(33%, n=1)

For Wangdue Dzongkhag, it was cabbage (58%, n=7), chilli (58%, n=7), carrot (42%, n=5), mustard green (42%, n=5) and tomato (40%, n=4). For Tsirang Dzongkhag, the five most promoted vegetable crops were bulb onion (89%, n=8), cabbage (78%, n=7), green bean (67%, n=6), ginger (67%, n=6) and broccoli (56%, n=5). For Dagana Dzongkhag, it was cabbage (89%, n=8), cauliflower (56%, n=5), radish (44%, n=4), green bean (33%, n=3) and broccoli (22%, n=2). For Gasa Dzongkhag, the five most promoted vegetable crops were broccoli (100%, n=3), bulb onion (100%, n=3), cabbage (67%, n=2), green bean (67%, n=2), and radish (33%, n=1).

3. 2.3.2. Most promoted/potential fruits and nuts crops

The five most promoted fruits and nuts were peach (49%, n=21), mango (47%, n=20), mandarin (40%, n=17), pears (40%, n=17) and soft shell walnut (37%, n=16). The average (in %), the reason for promotion of these crops were easy to market (15%), high yield (13%), easy to cultivate (10%) and competitive advantages (4%). However, the information is based on the data from four districts only as there was no information from respondents of Gasa Dzongkhag. The top five fruits and nuts crops for Punakha Dzongkhag were peach (70%, n=7), mango (50%, n=5), pears (50%, n=5), soft shell walnut (50%, n=5) and avocado (40%, n=4).

Table 3-10: Top five most promoted fruits and nuts in west central districts

Crop	Total		Reason for promotion				
	No	%	Easy to Cultivate	High Yield	Pest/ Disease Resistance	Easy to Market	Competitive advantages
Peach	21	49%	12%	21%	0%	14%	2%
Mango	20	47%	14%	7%	2%	19%	5%
Mandarin	17	40%	9%	9%	0%	19%	2%
Pear	17	40%	9%	16%	0%	9%	5%
Soft Shell walnut	16	37%	5%	12%	0%	16%	5%
Average reason for promotion (%)			10%	13%	0%	15%	4%

The top five fruits and nuts crops for Wangdue Dzongkhag were peach (66%, n=8), soft shell walnut (75%, n=9), pears (66%, n=8), avocado (33%, n=4) and apple (33%, n=4). For Tsirang Dzongkhag, it was peach (33%, n=3), mandarin (77%, n=7), banana (77%, n=7), mango (66%, n=6) and avocado (44%, n=4). With regard to Dagana Dzongkhag, peach (33%, n=3), mango (77%, n=7), mandarin (66%, n=6), banana (55%, n=5) and pears (33%, n=3).

Table 3-11: Dzongkhag wise top five most promoted fruits and nuts crops

Dzongkhag	Five most promoted fruit and nuts crops	
Punakha	Peach	(70%, n=7)
	Mango	(50%, n=5)
	Pear	(50%, n=5)
	Soft Shell Walnut	(50%, n=5)
	Avocado	(40%, n=4)
Wangdue	Peach	(66%, n=8)
	Soft Shell Walnut	(75%, n=9)
	Pear	(66%, n=8)
	Avocado	(33%, n=4)
	Apple	(33%, n=4)
Tsirang	Peach	(33%, n=3)
	Mandarin	(77%, n=7)
	Banana	(77%, n=7)
	Mango	(66%, n=6)
	Avocado	(44%, n=4)
Dagana	Peach	(33%, n=3)
	Mango	(77%, n=7)
	Mandarin	(66%, n=6)
	Banana	(55%, n=5)
	Pear	(33%, n=3)

3. 2.4. Most effective approach in horticulture technology promotion

The three most effective approach were model farm by systematic training (74%, n=32), integrated fruits and vegetable development model (70%, n=30) and equal opportunities (67%, n=29). The least effective approaches were field day/demonstration (33%, n=14) and crop competition/displays (9%, n=4).

Table 3-12: Most effective approach for horticulture technology promotion

Approach	Total		Effectiveness					
			Very Effective		Effective		Neutral	
	No	%	No	%	No	%	No	%
Model Farm by Systematic Training	32	74%	25	58%	7	16%	0	0%
Integrated Fruits and vegetable development model	30	70%	19	44%	8	19%	4	9%
Equal opportunity (Scattered)	29	67%	11	26%	14	33%	3	7%
Focus Village/Group	21	49%	14	33%	5	12%	2	5%
Field day/demonstrations	14	33%	5	12%	9	21%	0	0%
Crop competition/displays	4	9%	2	5%	1	2%	1	2%
Average effectiveness			13	29%	7	17%	2	4%

On the effectiveness of the approaches, 29% (n=13) rated the above listed approaches as very effective, 17% (n=7) as effective and 4% (n=2) as neutral.

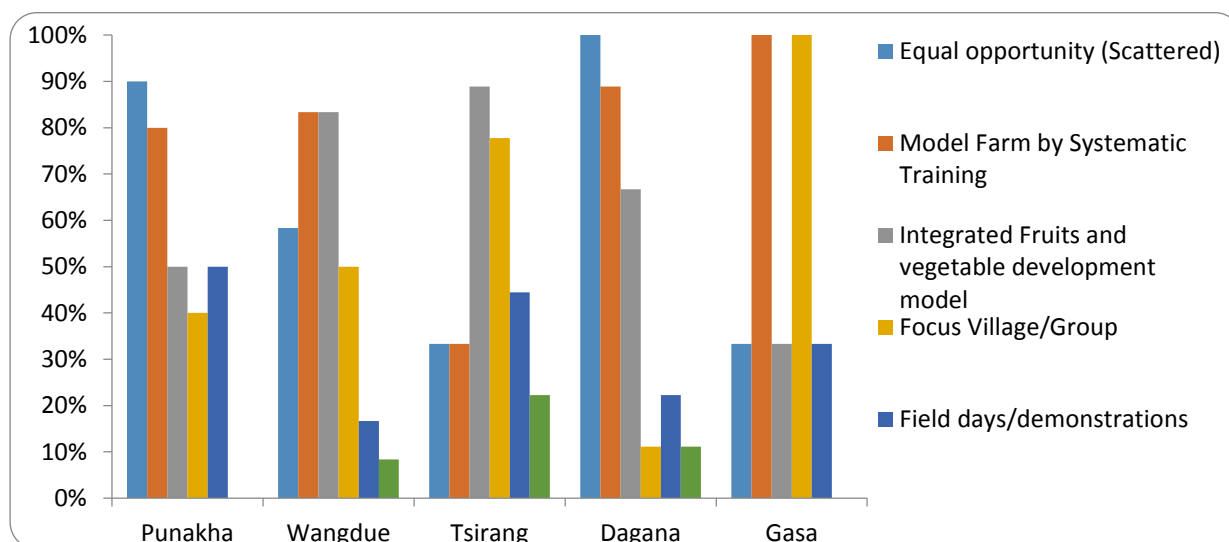


Figure 3-9: Dzongkhag wise most effective approach in horticulture technology promotion

The most effective approach, as per the respondents from Punakha Dzongkhag, was an equal opportunity (90%), followed by model farm by systematic training (80%). The least effective approach was focus village/group (40%). In Wangdue Dzongkhag, the most effective approaches were model farm by systematic training (83%) and integrated fruits and vegetable development model (83%). The least effective approach was crop competition (8%). With regard to the Tsirang Dzongkhag, the most effective approach was integrated fruits and vegetable development model (100%) and focus village/group (78%). The least effective approach was crop competition (22%).

For Dagana Dzongkhags, the most effective approach was an equal opportunity (100%), followed by model farm by systematic training (89%). The least effective approaches were focus village/group (11%) and crop competition (11%). For Gasa Dzongkhag, it was focus village/group (100%) and model farm by systematic training (100%). The least effective approach were field day/demonstrations (33%), equal opportunity (33%) and integrated fruits and vegetable development model (33%).

3. 2.5. Training/ guidance provided to the farmers

3. 2.5.1. Training/ guidance on vegetable cultivation provided to the farmers

The training/guidance provided to the farmers was led by the training on planting/transplanting (65%), nursery management (63%), pest and disease control (58%) and water management (49%). The least training provided were on seed production (9%), food preservation and processing (9%) and seed processing/quality management (2%). Of the total training provided by the extension personnel, the average modes of trainings were 41% lecture, 9% skill/practical and 50% with both lecture and practical component. The average self-rating on effectiveness on the total training was very effective (17%), effective

(55%), neutral (8%), not effective (15%) and not answer (5%). Only 6% of extension personal were very confident followed by, confident (21%) and neutral (2%). There was also who did not answer (3%).

Table 3-13: Trainings, effectiveness and confidence

Training Subject	Total		Training mode			Effectiveness					Confidence				
	Provided	needful	Knowledge	Skill	Both	Very Effective	Effective	Neutral	Not Effective	N.A	Very Confident	Confident	Neutral	Not confident	N.A
Planting/Transplanting	65%	65%	39%	11%	50%	21%	71%	7%	0%	0%	12%	44%	5%	2%	2%
Nursery Management	63%	63%	37%	4%	59%	26%	56%	15%	4%	0%	16%	28%	5%	2%	0%
Pest& Disease Control	58%	58%	64%	8%	28%	20%	64%	8%	4%	4%	7%	30%	7%	7%	7%
Water Management	49%	49%	38%	10%	52%	19%	76%	0%	0%	5%	5%	35%	7%	0%	2%
Soil Management	42%	42%	28%	6%	67%	6%	78%	6%	0%	11%	5%	30%	2%	0%	5%
Harvest/Post Harvest	37%	37%	31%	25%	44%	25%	56%	6%	6%	6%	5%	21%	2%	5%	5%
Variety & character of Crops	30%	30%	69%	8%	23%	8%	69%	23%	0%	0%	2%	19%	7%	0%	2%
Wild Animal Control	28%	28%	67%	8%	25%	33%	58%	0%	0%	8%	7%	14%	2%	2%	2%
Seed Production	9%	9%	25%	25%	50%	0%	75%	0%	25%	0%	0%	5%	0%	2%	2%
Food Preserv./Proces.	9%	9%	50%	0%	50%	25%	0%	25%	25%	25%	2%	0%	2%	2%	2%
Seed Proces./quality manage.	2%	2%	0%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	2%	0%
Average	36%	36%	41%	9%	50%	17%	55%	8%	15%	5%	6%	21%	4%	2%	3%

Regarding Punakha Dzongkhag, most of the trainings were on pest and disease control (70%) followed by variety and characteristic of crops (50%), planting and transplanting (50%) and nursery management (50%). The least training was on harvest/ post-harvest (20%) and soil management (10%). No training was provided on seed production, seed processing and quality management and food preservation/processing. For Wangdue Dzongkhag, it was on pest and disease control (67%). The least training was on seed production (8%), seed processing and quality management (8%), and food preservation/processing (8%). For Tsirang Dzongkhag, most of the trainings were provided on nursery management (100%), planting and transplanting (89%) and water management (89%).The least trainings were provided on harvest/ post-harvest (11%) and food preservation/processing (11%). No training was provided on seed processing and quality management. For Dagana Dzongkhag, the maximum trainings were provided for nursery management (78%) and planting/transplanting (78%). The least training was on wild animal control (11%). For Gasar Dzongkhag, the maximum training provided was on pest and disease control (100%), followed by soil management (67%), harvest/post-harvest (67%), seed production (67%), food processing/ processing (67%), planting/transplanting (33%) and wild animal control (33%).

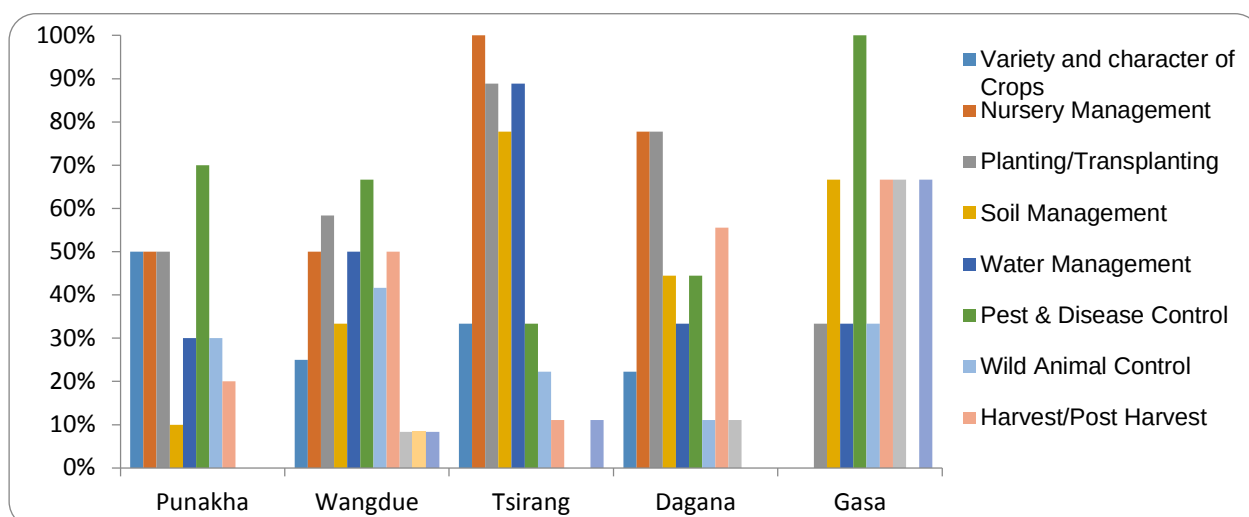


Figure 3-10: Dzongkhag wise training on provided vegetable cultivation

3. 2.5.2. Training/ guidance fruits and nuts cultivation provided to the farmers

The maximum training on fruits and nuts cultivation was provided on pruning/ training (53%), followed by planting/transplanting (49%) and pest and disease control (40%). A very few training were provided on seed production (5%), seed processing/ quality management (5%), food preservation and processing (5%). On the total trainings provided, the mode of the training was lecture (25%), skill/practical (16%), and both lecture and practical (59%). The average self-rating on the effectiveness of the trainings that were provided, it was very effective (23%), effective (43%), neutral (9%), not effective (11%), and no answer (14%). The confidence of the extensional personal of the subject of the trainings were very confident (3%), confident (16%), neutral (25), not confident (2%) and not answer (2%).

The maximum training on fruit and nuts cultivation provided by the Punakha Dzongkhag was on variety and characteristic of the crop (40%), pruning /training (40%), grafting/top working (40%), and pest and disease control (40%). No training was provided on fruit thinning and water management. The same in Wangdue Dzongkhag was on pruning/training (58%), grafting/top working (50%), and water management (50%). The least training was provided on variety and characteristic of crops (8%), nursery management (8%), fruit thinning (8%), seed production (8%), seed processing/ quality management (8%) and food preservation/ processing (8%).

Regarding Tsirang Dzongkhag, it was on pruning/training (89%), nursery management (78%) and planting/ transplanting (78%). Least training was provided on harvest/post-harvest (8%). No trainings were provided on variety and characteristic of the crop, seed production, seed processing/ quality management, and food preservation/ processing.

In Dagana Dzongkhag, it was on nursery management (78%) and planting/transplanting (67%). The least training was provided on grafting/ top working (22%) and fruit thinning (22%). No trainings were provided on seed production, seed processing/ quality management, and food preservation/ processing. There was no training on fruits and nuts production provided to the farmers by extension personal on In Gasa Dzongkhag.

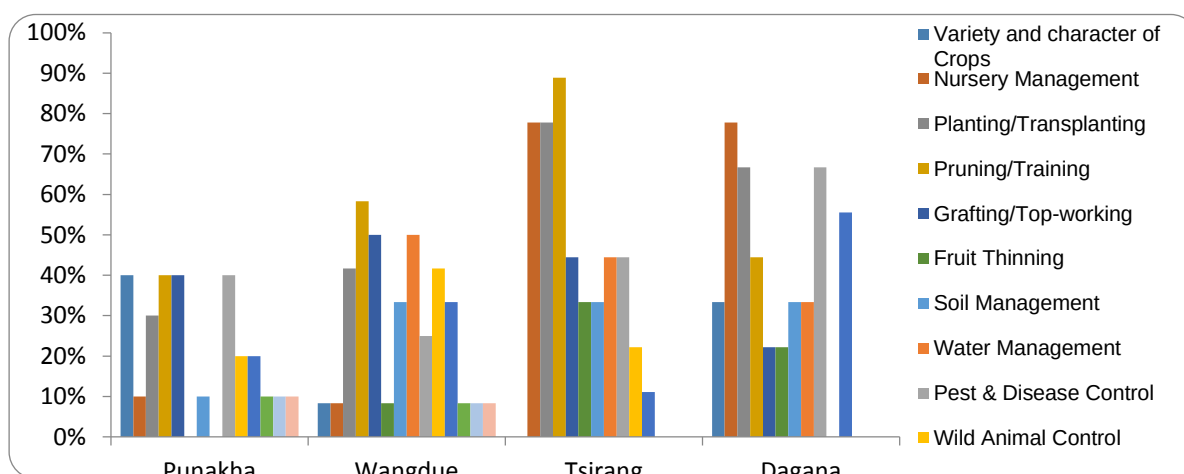


Figure 3-11: Dzongkhag wise training on fruits and nuts production provided to the farmers

3.3. Problems and constraints

The top problem/constraints for west central Dzongkhags, as per the extension personals, in implementation of activities were limited equipment/tools (72%, n=31) and limited knowledge/skill (67%, n=29). The least problems/ constraints were natural hazards (2%, n=1) and other (2%, n=1).

For Punakha Dzongkhag, the top problem/constraints were limited knowledge/skill (90%, n=9) and limited equipment/tools (80%, n=8). The least constraints/problems were uncontrollable pest/disease (10%, n=1), availability of seeds and seedlings (10%, n=1), ad-hoc assignments (10%, n=1) and wild animal damage (10%, n=1).

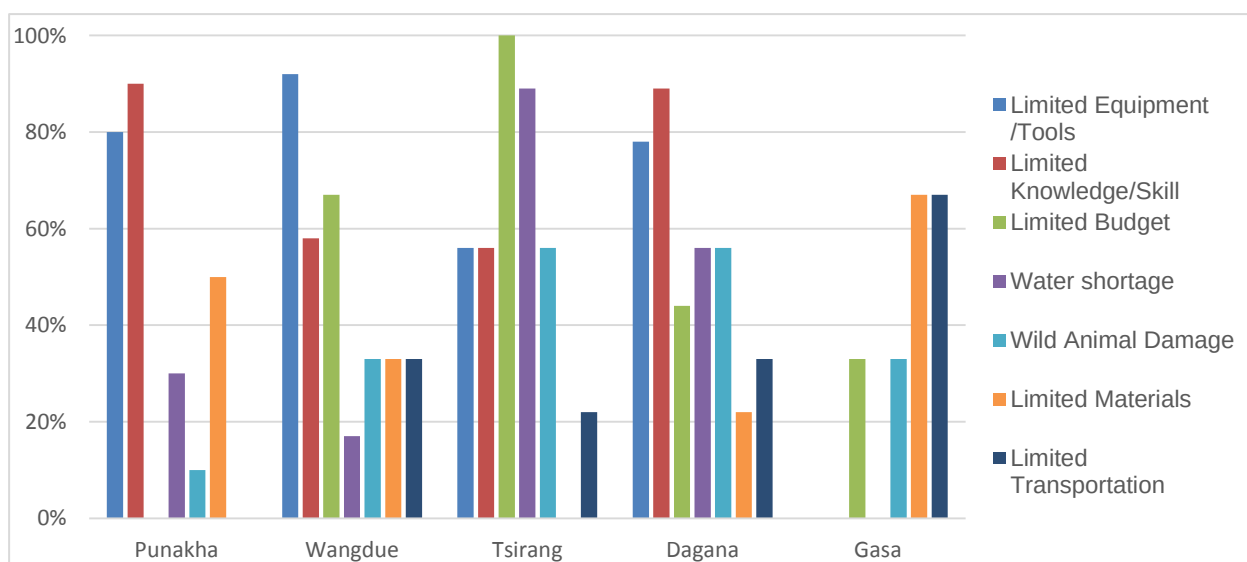


Figure 3-12: Problem and constraints in implementation of activities in Dzongkhag (%)

In the case of Wangdue Dzongkhag, it was limited equipment/tools (92 %, n=11) and limited budget (67%, n=8). The least constraints/problems were un-cooperative farmers (8%, n=1) and natural hazards (8%, n=1).

With regard to Tsirang Dzongkhag, limited budget (100%, n=9) and water shortage (89%, n=8) were the top problems. For Dagana Dzongkhag, the top constraints/ problems were limited equipment/tools (78 %, n=7) and limited knowledge/skill (89%, n=8). For Gasa Dzongkhag, the top constraints/problems were limited materials (67%, n=2) and limited transportations (67%, n=2).

3.4. Training needs

3.4.1. Training needs in vegetable cultivation

Five subjects out of 12 listed subjects selected by respondents. The most training required, on vegetable cultivation as per the extension personal, were on planting/transplanting (49%, n=21), variety and characteristic of the crop (44%, n=19), and soil management (44%, n=19). The percentage shares of each subject were through the total summation of maximum five mentioned subjects by each respondent converted into percentage likewise. The least required training was on farmers group management (21%, n=9) and preservation/processing (14%, n=6).

From among those who responded to the need for training, 44% wanted the training to be just on lecture mode, 11% on just the practical mode and 45% wanted the training to have both lecture and practical component on average.

Regarding the needfulness of the training, in average, 17% of the respondents felt it was very much needed, 14% felt it was needed and 1% wanted to attend if there was an opportunity.

Table 3-14: Training needs on vegetable cultivation

Subject	Total		Training mode			Needfulness			
	No.	%	Knowledge	Skill	Both	Very Much Needed	Needed	If there is Chance	NA
Planting/Transplanting	21	49%	38%	10%	52%	26%	23%	0%	0%
Variety and characteristic of Crops	19	44%	32%	21%	47%	26%	19%	0%	0%
Soil Management	19	44%	37%	11%	53%	14%	28%	2%	0%
Marketing	17	40%	53%	0%	47%	19%	14%	5%	2%
Nursery Management	16	37%	31%	6%	63%	19%	19%	0%	0%
Harvest/Post Harvest	16	37%	44%	19%	38%	14%	23%	0%	0%
Wild Animal Control	13	30%	38%	8%	54%	21%	7%	2%	0%
Seed Production	13	30%	69%	8%	23%	19%	9%	2%	0%
Water Management	12	28%	58%	17%	25%	19%	7%	2%	0%
Pest & Disease Control	10	23%	40%	20%	30%	5%	19%	0%	0%
Seed Proces./quality manage.	10	23%	40%	10%	50%	16%	5%	2%	0%
Farmer's Group Management	9	21%	44%	0%	67%	14%	7%	2%	0%
Preservation/Processing	6	14%	50%	17%	33%	7%	7%	0%	0%
Average			44%	11%	45%	17%	14%	1%	0%

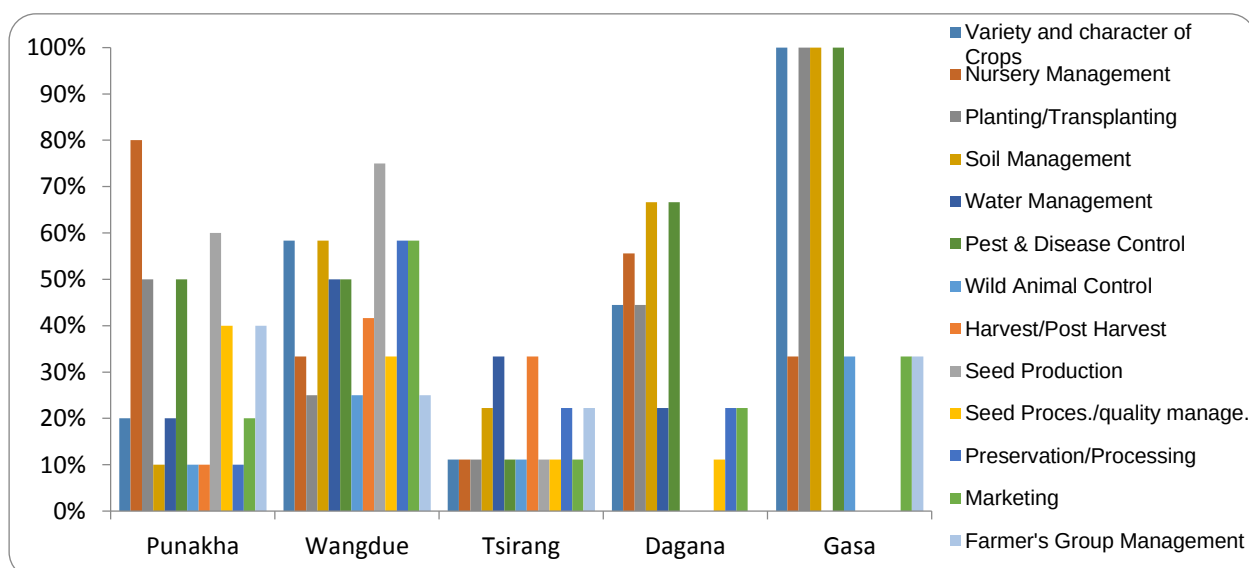


Figure 3-13: Dzongkhag wise training needs on vegetable cultivation (%)

For Punakha Dzongkhag, the training need for vegetable cultivation was led by nursery management (80%). The least required trainings were on wild animal control (10%), harvest/post-harvest (10%), preservation/processing (10%) and soil management (10%). For Wangdue Dzongkhag, it was led by seed production (75%). The least training requirements were on planting/transplanting (25%), wild animal control (25%) and farmers' group management (25%).

With regard to Tsirang Dzongkhag, it was led by water management (33%) and harvest/ post-harvest (33%). The least training requirements were on variety and characteristic of crops (11%), nursery management (11%), planting/transplanting (11%), pest and disease control (11%), wild animal control (11%), seed production (11%), seed processing/quality management (11%) and marketing (11%).

For Dagana Dzongkhag, the requirements were on soil management (67%) and pest/disease control (67%). The least training was required for seed processing/quality management (11%).

Gasa Dzongkhag requirement for training in vegetable cultivation was on variety and characteristic of crops (100%), planting/transplanting (100%), pest and disease control (100%) and soil management (100%). There was no training requirement for seed production, harvest/ post-harvest and seed processing/ quality management.

3.4.2. Training needs in fruits and nuts cultivation

Table 3-15: Training needs in fruits and nuts cultivation

Subject	Total		Training mode			Needfulness			
	No.	%	Knowledge	Skill	Both	Very Much Needed	Needed	If there is chance	NA
Pruning/Training	25	58%	44%	4%	52%	35%	23%	0%	0%
Grafting/Top-working	23	53%	35%	8%	57%	30%	16%	7%	0%
Nursery Management	21	49%	38%	5%	57%	35%	7%	2%	2%
Planting/Transplanting	20	47%	30%	5%	65%	30%	16%	0%	0%
Soil Management	18	42%	28%	6%	66%	26%	16%	0%	0%
Pest & Disease Control	15	35%	40%	7%	53%	16%	14%	2%	0%
Fruit Thinning	13	30%	31%	0%	69%	14%	12%	5%	0%
Water Management	12	28%	33%	0%	67%	12%	16%	0%	0%
Variety & characteristic of Crops	10	23%	80%	0%	20%	0%	7%	2%	2%
Harvest/Post Harvest	9	21%	44%	0%	56%	14%	5%	2%	0%
Food Preserv./Proces.	9	21%	44%	23%	33%	21%	0%	0%	0%
Marketing	9	21%	67%	11%	22%	16%	2%	2%	0%
Seed Production	8	19%	50%	12%	38%	7%	12%	0%	0%
Seed Proces./quality manag.	5	12%	40%	0%	60%	7%	5%	0%	0%
Farmer's Group Manage.	5	12%	20%	20%	60%	9%	2%	0%	0%
Wild Animal Control	2	5%	0%	100%	0%	2%	0%	2%	0%
Average			39%	13%	48%	17%	10%	2%	0%

Selected max 5 subject out of 12 listed subjects per respondents, the maximum training requirement for fruits and nuts cultivation, from extension officers, were on pruning/training (58%, n=25) and grafting/top working (53%, n=23). The least training requirement were on seed processing/ quality management (12%, n=5), farmers group management (12%, n=5) and wild animal control (5%, n=2). On the training mode from the responded answered training is needed (total of “very much need” “need” and If there is chance) of this particular question, 39% wanted the training to just lecture alone while 13% and 48% wanted the training to be just practical, and with both lecture and practical components respectively. Regarding the needfulness of the training, in average, 17% felt that the trainings were very much needed, 10 % felt it was needed, and 2% wanted to attend if there was the opportunity.

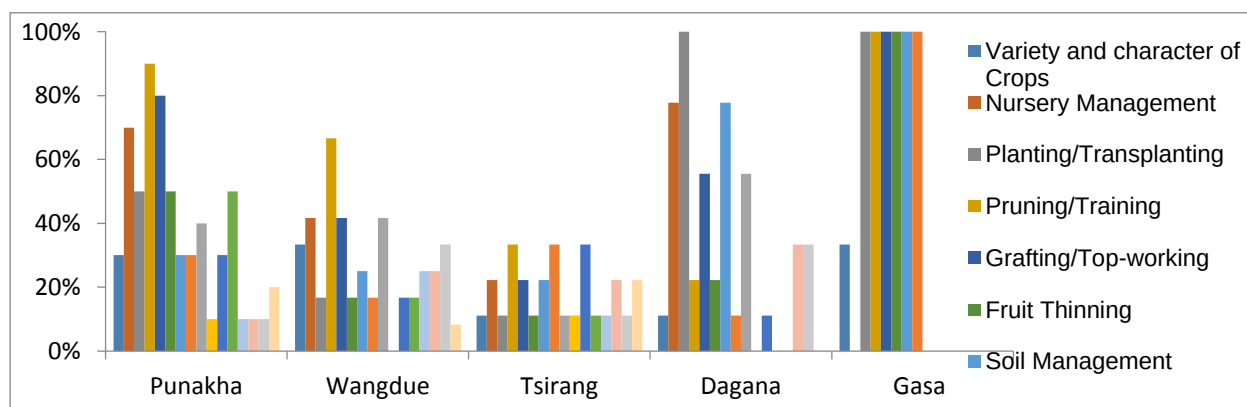


Figure 3-14: Dzongkhag wise training needs for fruits and nuts cultivation

For Punakha Dzongkhag, the most needed training on fruits and nut cultivation was on pruning and training (90%). The least required training was on seed processing/quality management (10%), food preservation/processing (10%), and marketing (10%).

For Wangdue Dzongkhag, the most needed training was on pruning/training (67%) and the least training needed was on farmer's group management (8%). There was no training requirement for wild animal control (0%).

The most needed training on fruit and nuts cultivation for Tsirang Dzongkhag were pruning/training (33%), water management (33%) and harvest/ post-harvest (33%). The least training needed was on variety and characteristic of the crops (11%), planting/transplanting (11%), fruit thinning (11%), pest/disease control (11%), wild animal control (11%), seed production (11%), seed processing/quality management (11%) and marketing (11%).

For Dagana Dzongkhag, the most needed training was on planting/transplanting (100%). There was no training requirement for wild animal control, seed production, seed processing/quality management and marketing (0%).

For Gasa Dzongkhags, all the respondents marked nursery management, fruit thinning, planting/transplanting, pruning/training, grafting/top working, soil management and water management as most needed (100%). There was no training requirement for the rest of the subjects.

3.5. Expectations from IHPP-JICA/Bajo

Most of the expectations expressed by the respondents were on except one which was on working tools.

- Training with demonstration on all aspect for fruit trees cultivation such as training, pruning, grafting, budding etc.
- Training and guidance on off season vegetable production.
- Technical capacity building on various aspects of vegetables cultivation
- Supply of basic working tools like grafting knife, pruning saw etc.
- Ex-country training/study tour
- Training/guidance on pest and disease control of fruits and vegetables
- Training with demonstration on all aspect for fruit trees cultivation such as training, pruning, grafting, budding etc.

Annexure1.**Project Design Matrix**

Project Title: Integrated Horticulture Promotion Project in the West Central Region (IHPP)

Implementing Agency: Agriculture Research and Development Centre (ARDC) Bajo, Department of Agriculture (DoA)

Target Group: [Direct] ARDC-Bajo/Mithun sub-centre staff, extension officers of the four project districts, pilot farmers [Indirect] Horticulture farmers in the target area

Period of Project: 12 Jan. 2016 to 11 Jan. 2021 (Five years)

Version 2

Dated: 24 Nov. 2016

Target Area: Four districts (Tsirang, Dagana, Wangdue Phodrang and Punakha) **Model Site/ Pilot Farmers:** To be determined by the Project

Narrative Summary		Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal	Horticulture production is expanded with appropriate technologies in the target	1. Production of promoted horticulture crops increased by 25% by 2024	1. Baseline Survey 2. Post project Sample survey	Horticulture market is enough to absorb the increased production		
Project Purpose	Implementation system for promotion of horticulture production in the target areas is developed	1. More than 95% of trained farmers adopt the appropriate technologies 2. More than 15,000 fruit seedlings are planted in target area and properly managed 3. More than 100kg of improved vegetable seeds are produced and supplied to farmers in target area, NSC and other ARDCs.	1. Follow-up survey 2. Follow-up survey 3. Follow-up survey	Severe natural disasters do not occur		
Outputs	1. Appropriate technologies for promoting horticulture farming are developed	1-1. More than 10 fruit crop varieties are identified as suitable for the project site and promoted 1-2. More than 10 vegetable crop varieties are identified as suitable for the project site and promoted 1-3. More than 10 extension materials on appropriate cultivation technologies are developed	1-1. Project Reports 1-2. Project Reports 1-3. Project Reports	Most of the counterpart are not transferred. Adequate counterparts are in place		
	2. Vegetable seeds and fruits seedlings production system at ARDC-Bajo, private nurseries and seed growers is strengthened	2-1. More than 30,000 fruit seedlings and 500kg vegetable seeds are produced at ARDC-Bajo/ARDSC-Mithun; private nurseries and seed growers	2-1. Project Reports			
	3. Training and extension system (outreach programs) for promoting horticulture farming is strengthened	3-1. More than 20 Researchers of ARDCs, 50 extension officers and 200 farmers are trained 3-2. More than 90 % of trained counterparts and extension officers apply key training contents in the field 3-3. More than 50 demonstration farms are developed (at least 2 farms per District) 3-4. More than 40 Focus villages are developed	3-1. Project Reports 3-2. Project Reports 3. Project Reports Project Reports 3-3-4.	Adequate budget made available to apply the training if required		

Activities	Inputs		Pre-Conditions		
	The Japanese Side	The Bhutanese Side			
1.1 Develop farm field and facility of ARDC-Bajo and Mithun sub-centers for appropriate technology development. 1.2 Introduce and identify suitable cultivars/varieties for horticulture farming in the target area in collaboration with ARDC-Wengkhar and other RDCs. 1.3 Develop horticulture production management practices (appropriate cultivation practices, pest management, post production techniques, soil nutrient, water management etc.) 1.4 Develop/improve appropriate extension materials 2.1 Identify/develop appropriate technologies for production of quality seeds and seedlings at ARDC-Bajo 2.2 Identify private nurseries and seed growers and to provide training for producing good quality seed and seedling 2.3 Monitor/follow up private nurseries and seed growers for good quality seed and seedling production 2.4 Provide technical support for good quality seed and seedling production in NSC-Bajo 3.1 Formulate/ modify outreach program in collaboration with ARDC-Wengkhar 3.2 Provide technical support for farm development of ADTC-Chimpang 3.3 Provide capacity development programs for researchers and extension officers 3.4 Provide training for farmers to establish demonstration farms and focus villages as well as to encourage vegetable farmers 3.5 Monitor and support extension activities by extension officers and demonstration farm owners	1. Long term experts Chief Advisor / Horticulture 1, Horticulture 2 / Plant diseases, Coordinator / Training 2. Short term experts as required 3. Training Counterpart training in Japan and/or third countries (to be determined) 4. Equipment - Necessary vehicles, agricultural machinery and equipment for project activities (to be determined) 5. Operational costs for the project	1. Counterpart personnel and supporting staff - Project Director / Project Manager - Counterpart personnel - Administrative staff - Secretaries, drivers for Japanese experts and other staff accordingly - 10 ESPs 2. Project office with necessary facilities 3. Operational costs for the Project 4. Equipment and facilities (to be determined) 5. Available data, information, documents and maps 6. Cost for development of basic infrastructure of ARDC-Bajo, Mithun sub-centre and ADTC-Chimpang	MoAF secures the adequate staff and budget necessary for the implementation of the Project.  <Issues and countermeasures>		

Annexure 2

Questionnaire for Baseline Survey of IHPP/JICA (Farmers Part A: General Information)

Date		Surveyor/Interviewer	
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1 Information of the Respondent/Household

1-1	Name		Gender	Male ☐	Female ☐		
1-2	Village		Age				
1-3	Gewog		Phone No.				
1-4	Dzongkhag		E-Mail	(Optional)			
1-5	House No.		Thram No				
1-6	Education level (Tick)	Non ☐	C 1~6 ☐	C 1~8 ☐	C 1~10 ☐	C 1~12 ☐	Degree/more ☐
1-7	Walking distance from Road head		Km	**From	Farm road ☐	Feeder road ☐	Highway ☐
1-8	Distance from nearest market		Km	**From	Farm road ☐	Feeder road ☐	Highway ☐
1-9	Altitude of farm						

2 Information of the Household Head

2-1	Name		2-4	Gender	Male ☐	Female ☐	
2-2	Occupation		2-5	Age			
2-3	Phone No.						
2-7	Education level (Tick)	Non ☐	C 1~6 ☐	C 1~8 ☐	C 1~10 ☐	C 1~12 ☐	Degree/more ☐

3 Information of Household Members

3-1 Family Members

Total family members under following age category (Including household head)

*Members living within the same household including children/dependent studying outside and inside the country

		Male	Female	Total
(1)	0~5 years old	Nos	Nos	Nos
(2)	6~13 years old	Nos	Nos	Nos
(3)	14~20 years old	Nos	Nos	Nos
(4)	21~40 Years old	Nos	Nos	Nos
(5)	41~60 Years old	Nos	Nos	Nos
(6)	Above 61 years old	Nos	Nos	Nos
	Total	Nos	Nos	Nos

4 Land Holding and Agriculture Activities

(See "Units Conversion Tables RNR Census 2009)

Total Land

	Acre
--	------

Wet Land

	Acre
--	------

***If fallow**, what are the reasons?

Cultivated		Acre	(Enter all relevant reason No. from provided below) 1: Labour shortage, 2: Wild Animals, 3: Market Access/Remoteness, 4: Lack of irrigation, 5: Not suitable for farming, 0.N.A
Leased out		Acre	
Leased in		Acre	
*Fallow		Acre	

Dry Land		Acre	*If fallow , what are the reasons?	
Cultivated		Acre	(Enter all relevant reason No. from provided below) 1: Labour shortage, 2: Wild Animals, 3: Market Access/Remoteness, 4: Lack of irrigation, 5: Not suitable for farming, 0.N.A	
Leased out		Acre		
Leased in		Acre		
*Fallow		Acre		

5 Water/Irrigation availability

(*Check either)

*Water Sufficiency

Water Source

*If 2. Own, availability

** If community, managed by availability

1. Sufficient	☐	2. Not sufficient	☐
1. Rain	☐	*2. Own	☐
1. Perennial	☐	2. Seasonal	☐
1. Group	☐	2. LC/LG	☐
1. Perennial	☐	2. Seasonal	☐

6 Farm Machineries and Facilities

Items	Nos	Ownership		Source (Brought or Received from Supporter)			
		Self (Brought)	Community /Group	Dzongkhag	AMC	*Other Gov.	Private Ent./Other
Tractor	Nos	☐	☐	☐	☐	☐	☐
Power tiller	Nos	☐	☐	☐	☐	☐	☐
Reaper	Nos	☐	☐	☐	☐	☐	☐
Oil expeller	Nos	☐	☐	☐	☐	☐	☐
Rice huller	Nos	☐	☐	☐	☐	☐	☐
Paddy thresher	Nos	☐	☐	☐	☐	☐	☐
Water pump	Nos	☐	☐	☐	☐	☐	☐
Dryer	Nos	☐	☐	☐	☐	☐	☐
Flour mill	Nos	☐	☐	☐	☐	☐	☐
Electric Fence	Nos	☐	☐	☐	☐	☐	☐
()	Nos	☐	☐	☐	☐	☐	☐

* Such as NPHC, NPPC, etc.

7 Mobility/Vehicle

Truck	Nos	
Car	Nos	
Motorbike	Nos	
Bicycle	Nos	

8 Household annual income	No. of family members engaged	Total Annual Income	Nu.
*Agriculture (Total)	Nos	Annual Income	Nu.
Government Service	Nos	Annual Income	Nu.
Private enterprises	Nos	Annual Income	Nu.
Self-owned business	Nos	Annual Income	Nu.
**Day worker (Labour)	Nos	Annual Income	Nu.
Pension	Nos	Annual Income	Nu.
Remittance	Nos	Annual Income	Nu.
Others	Nos	Annual Income	Nu.

* To be added up from Agricultural activities in Part B.

* Excluding labour exchange with Neighbours..

Questionnaire for Baseline Survey of IHPP/JICA (Farmers)

Part B: Agricultural Activities

1 Cultivated Crops

Please fill all Agriculture Activities (Cultivation area, Production, Annual Income, Selling price, etc.)

Market:	1: Neighbours, 2: Road-side Market, 3: Town/Weekend Market, 4: Big City (Thimphu, Gelephu, Bajo, etc.) 5: Buyer/Vendor, 6: School, 7: Religious Institution, 8: Projects, 9: Auction yard/FCB, 10: Other
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* See reference for Unit conversion, Rice milling recovery, etc.

Crops	Total Land		Cultivated in		Total Production (Kg)	Cultivated for Home Consumption (No.)		* If for Marketing, Annual Income (Nu)	Selling Price (@ Nu.)	
	Wet Land (Acre)	Dry Land (Acre)	*L□/D□	*L□/D□		Home Consumption (No.)	*Market (No.)		Maximum (Nu/Unit)	Minimum (Nu/Unit)
*Rice (1 Cropping)	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
*Rice (2 Cropping)	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Wheat	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Maize	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Buckwheat	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Cassava	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Mustard Oil	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Other ()	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
* Tick either Langdos or Decimals, then convert to Acers later					Total Income	Nu				

1-2 Horticulture Crop

1-2-1 *Vegetable

Total Land	Acre
Total Land	Acre

Market:	1: Neighbours, 2: Road-side Market, 3: Town/Weekend Market, 4: Big City (Thimphu, Gelephu, Bajo, etc.) 5: Buyer/Vendor, 6: School, 7: Religious Institution, 8: Projects, 9: Auction yard/FCB, 10: Other
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Crops	Cultivated in		Total Production (Kg)	Cultivated for Home Consumption (No.)		* If for Marketing, Annual Income (Nu)	Selling Price (@ Nu.)		
	Wet Land (Acre)	Dry Land (Acre)		Home Consumption (No.)	*Market (No.)		Maximum (Nu/Unit)	Minimum (Nu/Unit)	
Broccoli	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg
Cabbage	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg
Chinese Cabbage	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg
Cauliflower	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg
Radish	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg

Market:	1: Neighbourhoods, 2: Road-side Market, 3: Town/Weekend Market, 4: Big City (Thimphu, Gelephu, Bajo, etc.) 5: Buyer/Vendor, 6: School, 7: Religious Institution, 8: Projects, 9: Auction yard/FCB, 10: Other									
	Cultivated in				Total Production (Kg)	Cultivated for		* If for Marketing, Annual Income (Nu)	Selling Price (@ Nu.)	
	Wet Land (Acre)	Dry Land (Acre)				Home Consump (Tons)	*Market (No.)		Maximum (Nu/Unit)	Minimum (Nu/Unit)
Turnip	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Carrot	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Pea	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Lettuce	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Coriander	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Spinach	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Mustard green (Saag)	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Japanese green	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Onion (Bulb)	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Spring onion	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Bunching onion	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Chili	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Chili (Doley)	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Kidney Bean	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Green Bean	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Mung Bean (Green)	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Red Bean	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Soya Bean	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Seewee Beans (Flat)	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Bottle gourd	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Bitter gourd	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Snake gourd	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Spine gourd	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Ridge gourd	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg
Pointed gourd	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg	/Kg

Market:		1: Neighbours, 2: Road-side Market, 3: Town/Weekend Market, 4: Big City (Thimphu, Gelephu, Bajo, etc.) 5: Buyer/Vendor, 6: School, 7: Religious Institution, 8: Projects, 9: Auction yard/FCB, 10: Other									
Crops	Cultivated in		Total Production (Kg)	Cultivated for Home Consump (Ticket)		* If for Marketing, Annual Income (Nu)	Selling Price (@ Nu.)				
	Wet Land (Acre)	Dry Land (Acre)		*Market (No.)	Then		Maximum (Nu/Unit)	Minimum (Nu/Unit)			
Slippers Gourd	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg		
Birinjal	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg		
Tomato	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg		
Lady finger	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg		
Pumpkin	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg		
Squash	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg		
Water Melon	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg		
Asparagus	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg		
Potato	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg		
Tree Tomato (Tamarillo)	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg		
Cucumber	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg		
()	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg		
Total Income					Nu						

*** Tick either Langdos or Decimals, then convert to Acers later**

1-2-2 Industrial Crop

Total Land		Acre	
Market: 1: Neighbours, 2: Road-side Market, 3: Town/Weekend Market, 4: Big City (Thimphu, Gelephu, Bajo, etc.) 5: Buyer/Vendor, 6: School, 7: Religious Institution, 8: Projects, 9: Auction yard/FCB, 10: Other			

Crops	Cultivated in		Total Production (Kg)	Cultivated for Home Consump (Ticket)		* If for Marketing, Annual Income (Nu)	Selling Price (@ Nu.)		
	Wet Land (Acre)	Dry Land (Acre)		*Market (No.)	Then		Maximum (Nu/Unit)	Minimum (Nu/Unit)	
Garlic	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg
Ginger	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg
Cardamom	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg
Turmeric	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg
Oyster Mushroom	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg
Shitake Mushroom	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg
()	*L□/D□	ac	*L□/D□	ac	/Kg	□	()	Nu	/Kg
Total Income					Nu				

1-2-3 Fruits and Nuts

Market:	1: Neighbours, 2: Road-side Market, 3: Town/Weekend Market, 4: Big City (Thimphu, Gelephu, Bajo, etc.) 5: Buyer/Vendor, 6: School, 7: Religious Institution, 8: Projects, 9: Auction yard/FCB, 10: Other
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* See reference for Unit conversion, Rice milling recovery, etc.

** Fill name if they know or Tick ☐ "Local"

Crop	Variety		Bearing (Nos)		Not Bearing (Nos)		Total Trees (Nos)	Production (Kg)	Cultivated for		* If for Marketing, Main Market Annual Income (Nu)	Selling Price (@ Nu.)	
	Name	**Local	Youngest (Age)	Oldest (Age)	Youngest (Age)	Oldest (Age)			Home Consump. (Tick ☐)	*Market (No) Then ➡		Maximum (Nu/Unit)	Minimum (Nu/Unit)
Almond		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Apple		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Apricot		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Chestnut		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Hazelnut		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Peach		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Pear		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Pecan nut		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Persimmon		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Plum		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Hard Shell walnut		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg

Market:		1: Neighbours, 2: Road-side Market, 3: Town/Weekend Market, 4: Big City (Thimphu, Gelephu, Bajo, etc.) 5: Buyer/Vendor, 6: School, 7: Religious Institution, 8: Projects, 9: Auction yard/FCB, 10: Other											
Crop	Variety		Bearing (Nos)		Not Bearing (Nos)		Total Trees (Nos)	Production (Kg)	Cultivated for		* If for Marketing, Main Market Annual Income (Nu)	Selling Price (@ Nu.)	
	Name	**Local	Youngest (Age)	Oldest (Age)	Youngest (Age)	Oldest (Age)			Home Consump. (Tick ☐)	*Market (No)		Maximum (Nu/Unit)	Minimum (Nu/Unit)
Soft Shell walnut		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Kiwi		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Avocado		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Guava		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Pomegranate		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Lime / Lemon		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Mandarin (Orange)		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Pumelo		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Passion Fruit		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Banana		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Litchi		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg
Mango		☐	Nos. year	Nos. year	Nos. year	Nos. year	Nos	Kg	☐	()	Nu	/Kg	/Kg

Market:		1: Neighbours, 2: Road-side Market, 3: Town/Weekend Market, 4: Big City (Thimphu, Gelephu, Bajo, etc.) 5: Buyer/Vendor, 6: School, 7: Religious Institution, 8: Projects, 9: Auction yard/FCB, 10: Other											
Crop	Variety		Bearing (Nos)		Not Bearing (Nos)		Total Trees (Nos)	Production (Kg)	Cultivated for		* If for Marketing, Main Market Annual Income (Nu)	Selling Price (@ Nu.)	
	Name	**Local	Youngest (Age)	Oldest (Age)	Youngest (Age)	Oldest (Age)			Home Consump. (Tick)	*Market (No)		Maximum (Nu/Unit)	Minimum (Nu/Unit)
Jack Fruit		☐	Nos.				Nos.		☐	()	Nu	/Kg	/Kg
Areca Nut		☐	Nos.				Nos.		☐	()	Nu	/Kg	/Kg
Papaya		☐	Nos.				Nos.		☐	()	Nu	/Kg	/Kg
Pine Apple		☐	Nos.				Nos.		☐	()	Nu	/Kg	/Kg
Strawberry		☐	Nos.				Nos.		☐	()	Nu	/Kg	/Kg
Grapes		☐	Nos.				Nos.		☐	()	Nu	/Kg	/Kg
Other ()		☐	Nos.				Nos.		☐	()	Nu	/Kg	/Kg
Other ()		☐	Nos.				Nos.		☐	()	Nu	/Kg	/Kg
Total Income												Nu	

3. Forest

* Harvest form the forest such as Mushroom, Ferns, Medicinal plant, etc.

Market:	1: Neighbours, 2: Road-side Market, 3: Town/Weekend Market, 4: Big City (Thimphu, Gelephu, Bajo, etc.)												
	5: Buyer/Vendor, 6: School, 7: Religious Institution, 8: Projects, 9: Auction yard/FCB, 10: Other												
Crop	Variety		Bearing (Nos)		Not Bearing (Nos)		Total Trees (Nos)	Production (Kg)	* If for Marketing, Main Market		Selling Price (@ Nu.)		
	Name	**Local	Youngest (Age)	Oldest (Age)	Youngest (Age)	Oldest (Age)			Home Consump (Tick ☐)	*Market (No) Then ➡	Annual Income (Nu)	High (Nu/Unit)	Low (Nu/Unit)
()		☒							Kg	☐	()	Nu	/Kg
()		☒							Kg	☐	()	Nu	/Kg
()		☒							Kg	☐	()	Nu	/Kg
										Total Income		Nu	

4 Livestock

(1) Draught Animal

Ox/Cow		heads	Annual Income	Nu.	Price@	/Head
Buffalo		heads	Annual Income	Nu.	Price@	/Head
Horse		heads	Annual Income	Nu.	Price@	/Head
		heads	Annual Income	Nu.	Price@	/Head
		heads	Annual Income	Nu.	Price@	/Head
		heads	Annual Income	Nu.	Price@	/Head
		heads	Annual Income	Nu.	Price@	/Head
		fishes	Annual Income	Nu.	Price@	/Kg/Head
		heads	Annual Income	Nu.	Price@	/Kg/Head
			Total Income	Nu		

For Milk production (Price @)

Milk	Butter	Cheese
/L	/Kg	/Ball

(2) Dairy Cattle/Calf

(3) Goat/Sheep

(4) Poultry

(5) Swine(pig)

(6) Fishery

(7) Others

5 Farmers Group Activities

Are you or any of Family members a member of any Famers Group?

1: Yes	☐	2: No	☐
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If yes, answer the following.

Name					Name						
Established Year	Registered	1: Yes	☐	2: No	☐	Established Year	Registered	1: Yes	☐	2: No	☐
Name of Family Member					Name of Family Member						
Position in Group	1. Board Memb	☐	2. Member	☐	☐	Position in Group	1. Board Member	☐	2. Member	☐	
Activity of Group					Activity of Group						
1. Production	☐	2. Marketing	☐	☐	☐	1. Production	☐	2. Marketing	☐		
Annual Income	Group	Nu	Household	Nu	Annual Income	Group	Nu	Household	Nu		

Name					Name						
Established Year	Registered	1: Yes	☐	2: No	☐	Established Year	Registered	1: Yes	☐	2: No	☐
Name of Family Member					Name of Family Member						
Position in Group	1. Board Memb	☐	2. Member	☐	☐	Position in Group	1. Board Member	☐	2. Member	☐	
Activity of Group					Activity of Group						
1. Production	☐	2. Marketing	☐	☐	☐	1. Production	☐	2. Marketing	☐		
Annual Income	Group	Nu	Household	Nu	Annual Income	Group	Nu	Household	Nu		

Name					Name						
Established Year	Registered	1: Yes	☐	2: No	☐	Established Year	Registered	1: Yes	☐	2: No	☐
Name of Family Member					Name of Family Member						
Position in Group	1. Board Memb	☐	2. Member	☐	☐	Position in Group	1. Board Member	☐	2. Member	☐	
Activity of Group					Activity of Group						
1. Production	☐	2. Marketing	☐	☐	☐	1. Production	☐	2. Marketing	☐		
Annual Income	Group	Nu	Household	Nu	Annual Income	Group	Nu	Household	Nu		

Grand Total Annual Income from Agricultural Activities		Nu
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PART C : Horticulture Related Issues and Problem of the Farmers

1 Vegetable Cultivation

1-1 Seeds/Seedling

1-1-1 Have you bought/received **Vegetable Seeds/Seedling** from others?

1: Yes ☐ 2: No ☐ If yes, from which source and at what cost?

(Enter max 5 major crops)

*Enter Price (Nu) and unit (i.e. 10g, 100g, Kg, No., Pct., Bundle). See reference for Unit conversion..

Source	Name of Crop and Unit Price				
	Crop	*Price	Crop	*Price	Crop
Dzongkhag					
RDC					
NSC/Commission Agent		/		/	/
Private Enterprise		/		/	/
Seed/Seedling growers		/		/	/
Neighbours		/		/	/
Other ()		/		/	/

1-1-2 Evaluation of Quality and Quantity

(1) If Yes in above, evaluate the Quality/Quantity. (Tick ☐ most relevant evaluation)

(Tick ☐ all that apply)

(2) If you selected [3: Not satisfied] on Quality, please provide the reasons

Source	*Quality				*Quantity				Remarks
	1: Satisfied	2: Neutral	3: Not Satisfy. (Reason No.)	0: N.A	1: Sufficient	2: Neutral	3: Not Satisfy	0: N.A	
Dzongkhag	☐	☐	☐ ()	☐	☐	☐	☐	☐	
RDC	☐	☐	☐ ()	☐	☐	☐	☐	☐	
NSC/Commission Agent	☐	☐	☐ ()	☐	☐	☐	☐	☐	
Private Enterprise	☐	☐	☐ ()	☐	☐	☐	☐	☐	
Seed/Seedling growers	☐	☐	☐ ()	☐	☐	☐	☐	☐	
Neighbours	☐	☐	☐ ()	☐	☐	☐	☐	☐	
Other ()	☐	☐	☐ ()	☐	☐	☐	☐	☐	

1-1-3 Do you **Sell Vegetables Seed/Seedling**?

(1) If yes, Where and at What price?

(Enter max 5 major crops)

*Enter Price (Nu) and unit (i.e. 10g, 100g, Kg, No.). See reference for Unit conversion..

sell to/at	Name of Crop and Unit Price				
	Crop	*Price	Crop	*Price	Crop
In village/Neighbours		/		/	/
Road side market		/		/	/
Town/Weekend market		/		/	/
Dzongkhag/Gewog		/		/	/
RDC/HD		/		/	/
Commission Agent/NSC		/		/	/

sell to/at	Name of Crop and Unit Price					
	Crop	*Price	Crop	*Price	Crop	*Price
Schools		/		/		/
Religious Institution		/		/		/
Pvt. Ent./Projects		/		/		/
Auction yards/FCB		/		/		/
Other ()		/		/		/

1-2 Suitable/Potential Vegetable Crops

1-2-1 Please list the most suitable/potential crops for your farm according to you and provide reasons (Max 5 crops. Tick all reasons that apply)									
Name of crop	1: Easy to Cultivate	2: High Yield	3: Pest/ Disease Resistance	4: High Demand/Price	5: Multiple/Long Harvest	6:Easy transportation	7: Good shelf life	8. Suitable for Relay Cropping	9. Others (Specify)
	☐	☐	☐	☐	☐	☐	☐	☐	0: N.A
	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐

1-2-2 Do you have interest in cultivating new crops (besides the ones you are already cultivating)?

If "1: Yes", please provide name of Crops and reasons. (Max 5 crops. Tick all reason that apply)									
		1: Yes	2: Yes, but have no idea what crops are suitable.	(Max 5 crops. Tick all reason that apply)					
Name of crop	1: Easy to Cultivate	2: High Yield	3: Pest/ Disease Resistance	4: High Demand/Price	5: Multiple Harvest	6:Easy transportation	7: Good shelf life	8. Suitable for Relay Cropping	9. Others (Specify)
	☐	☐	☐	☐	☐	☐	☐	☐	0: N.A
	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐

1-3 Problems/Constraints

1-3-1 Do you have any major problem/constraint in vegetable cultivation?

1: Yes	☐	2: No	☐
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(1) If yes, what are the problems/constraints? (Select Max 5 most serious problems/constraints, and rank the seriousness) 1: Most serious, 2: Serious, 3: Least Serious

Problem/Constraint	Tick	Rank	If any particular.....	
Lack of Knowledge/Skill	☐	()		
Lack of Man power	☐	()		
Water shortage	☐	()		
No seed/seedling available	☐	()		
Poor Soil Fertility	☐	()		
Poor Seed/Seedling	☐	()		
Pest/Disease	☐	()		
Low Market Price	☐	()		
Market Access	☐	()		
Limited Fund	☐	()		
Wild Animal Damage	☐	()		
Noxious/ persistent Weeds	☐	()		
Natural Disaster	☐	()		
Limited Land				
Other ()	☐	()		

2 Fruits/Nuts Cultivation

2-1 Seeds/Seedling

2-1-1 Do you buy Fruit/Nut Seeds/Seedling?

(1) If yes, Where and at What price?

(Enter max 5 major crops)

1: Yes	☐	2: No	☐
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*Enter Price (Nu) and unit (i.e. 10g, 100g, Kg, No.). See reference for Unit conversion..

Source	Name of Crop and Unit Price					
	Crop	*Price	Crop	*Price	Crop	*Price
Dzongkhag						
RDC						
NSC/Commission Agent		/		/		/
Private Enterprise		/		/		/
Seed/Seedling growers		/		/		/
Neighbours		/		/		/
Other ()		/		/		/

2-1-2 Evaluation of Quality and Quantity

(1) If Yes in above, evaluate the Quality/Quantity. (Tick ☐ most relevant evaluation)

(Tick ☐ all that apply)

(2) If you selected [3: Not satisfied] on Quality, please provide the reasons

Source	*Quality				*Quantity				Remarks
	1: Satisfied	2: Neutral	3: Not Satisfy. (Reason No.)	0: N.A	1: Sufficient	2: Neutral	3: Not Satisfy	0: N.A	
Dzongkhag	☐	☐	☐ ()	☐	☐	☐	☐	☐	
RDC	☐	☐	☐ ()	☐	☐	☐	☐	☐	
NSC/Commission Agent	☐	☐	☐ ()	☐	☐	☐	☐	☐	
Private Enterprise	☐	☐	☐ ()	☐	☐	☐	☐	☐	
Seed/Seedling growers	☐	☐	☐ ()	☐	☐	☐	☐	☐	
Neighbours	☐	☐	☐ ()	☐	☐	☐	☐	☐	
Other ()	☐	☐	☐ ()	☐	☐	☐	☐	☐	

2-1-3 Do you Sell Fruits Seed/Seedling?

(1) If yes, Where and at What price?

(Enter max 5 major crops)

1: Yes	☐	2: No	☐
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*Enter Price (Nu) and unit (i.e. 10g, 100g, Kg, No.). See reference for Unit conversion..

sell to/at	Name of Crop and Unit Price					
	Crop	*Price	Crop	*Price	Crop	*Price
In village/Neighbours		/		/		/
Road side market		/		/		/
Town/Weekend market		/		/		/
Dzongkhag/Gewog		/		/		/
RDC/HD		/		/		/

sell to/at	Name of Crop and Unit Price					
	Crop	*Price	Crop	*Price	Crop	*Price
In village/Neighbours		/		/		/
Commission Agent/NSC		/		/		/
Schools		/		/		/
Religious Institution		/		/		/
Pvt. Ent./Projects		/		/		/
Auction yards/FCB		/		/		/
Other ()		/		/		/

2-2 Suitable/Potential Fruit/Nut Crops

2-2-1 Please list the most suitable/potential crops for your farm according to you and provide reasons (Max 5 crops. Tick ☐ all reason that apply)

Name of crop	1: Easy to Cultivate	2: High Yield	3: Pest/ Disease Resistance	4: High Demand/Price	5: Multiple Harvest	6: Easy transportation	7: Good shelf life	8: First Harvest/Bearing	9. Long Life	10. Others (Specify)
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

2-2-2 Do you have any crops Interested to cultivate besides the ones your are already cultivating?

1: Yes	☐	2: Yes but don't know suitable Crops.	☐	3: No	☐
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If "1: Yes", please provide name of Crops and reasons. (Max 5 crops. Tick ☐ all reason that apply) (Max 5 crops. Tick ☐ all reason that apply)

Name of crop	1: Easy to Cultivate	2: High Yield	3: Pest/ Disease Resistance	4: High Demand/Price	5: Multiple Harvest	6: Easy transportation	7: Good shelf life	8: First Harvest/Bearing	9. Long Life	10. Others (Specify)
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

2-3 Problem/Constraint

2-3-1 Do you have any major problem/constraint in Fruit/Nut cultivation?

1: Yes	☐	2: No	☐
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If yes, what are the problems/constraints? (Select Max 5 most serious problems/constraints, and rank the seriousness)				1: Most serious, 2: Serious, 3: Least Serious
Problem/Constraint	Tick	Rank	If any particular.....	
Low Yield	☐	()		
Lack of Knowledge/Skill	☐	()		
Lack of Man power	☐	()		
Water shortage	☐	()		
No seed/seedling available	☐	()		
Poor Soil Fertility	☐	()		
Poor Seed/Seedling	☐	()		
Pest/Disease	☐	()		
Low Market Price	☐	()		
Market Access	☐	()		
Limited Fund	☐	()		
*Wild Animal Damage	☐	()		
Natural Disaster	☐	()		
Other ()	☐	()		

* Including Rat, Mole, Dog, Domestic livestock, etc.

3 Farming Inputs and Materials (Fertilizer, Chemical, Farm Tools)

3-1 Have you ever bought/received Farm Materials?

1: Yes	☐	2: No	☐
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3-2 If yes, from which source and how do you evaluate the Quality of the farm materials you bought/received?

Source	1: Satisfied			2: Neutral			3: Not Satisfied			0: N.A			(Tick all that apply and choose the most relevant evaluation No.to enter)		
	Fertilizers	Chemicals	Irrigation Materials	Green House/Plastic	Farm Machinery	Farm Tools	Food Dryer	Storage equipment	Remarks						
Gewog/Dzongkhag	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()							
RDC	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()							
Horticulture Div./DoA	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()							
NSC/Commission Agent	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()							
AMC	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()							
NPHC	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()							
NPPC	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()							
Local Market/Private Enterprise	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()							
Neighbours	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()							
NGO ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()							
Foreign Donor ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()							
Other ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()							

3-3 If you selected [3: Not satisfied] , please give reason

Source	<Reasons>									(Enter the reason No. all that apply)
	Fertilizers	Chemicals	Irrigation Materials	Green House/Plastic	Farm Machinery	Farm Tools	Food Dryer	Storage equipment	Remarks	
Gewog/Dzongkhag	()	()	()	()	()	()	()	()		
RDC	()	()	()	()	()	()	()	()		
Horticulture Div./DoA	()	()	()	()	()	()	()	()		
NSC/Commission Agent	()	()	()	()	()	()	()	()		
AMC	()	()	()	()	()	()	()	()		
NPHC	()	()	()	()	()	()	()	()		
NPPC	()	()	()	()	()	()	()	()		
Local Market/Private Enterprise	()	()	()	()	()	()	()	()		
Neighbours	()	()	()	()	()	()	()	()		
NGO ()	()	()	()	()	()	()	()	()		
Foreign Donor ()	()	()	()	()	()	()	()	()		
Other ()	()	()	()	()	()	()	()	()		

3-4 Chemical Use

If you marked "Chemicals" in Q.3-1, what chemicals do you spray? And, evaluate its efficiency.

(Choose the most relevant answer)

Particulars	Name of Chemical		1: Worked	2: Neutral	3: Not Worked	0: N.A	Remarks
	Don't Know	Name (if you know)					
Weedicide	☐		☐	☐	☐	☐	
Pesticide	☐		☐	☐	☐	☐	
Fungicide	☐		☐	☐	☐	☐	
Rodenticide	☐		☐	☐	☐	☐	
Other ()	☐		☐	☐	☐	☐	
Other ()	☐		☐	☐	☐	☐	

5 Training/Guidance Requirements

5-1 Have you or any of family member ever received Training/Guidance on **Horticulture Production**?

5-1-1 **If Yes**, from whom, on which topic and on what mode (Theory or Practical)?

1: Yes	☐	2: No	☐
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<Mode> 1: Lecture, 2: Practical, 3: Lecture & Practical, 4: Observation/Study Tour, 5: Others (Particular)

(Enter all that apply)

Issue	DAO/Gewog	RDC	AMC	NPPC	Other RGB	Japan/JICA	UN/WB	Other Donor	NGO	Others (Specify)
Vegetable production	()	()	()	()	()	()	()	()	()	
Vegetable seed production	()	()	()	()	()	()	()	()	()	
Fruit Nursery production	()	()	()	()	()	()	()	()	()	
Fruit Orchard management	()	()	()	()	()	()	()	()	()	
Soil Management	()	()	()	()	()	()	()	()	()	
Irrigation Management	()	()	()	()	()	()	()	()	()	
Pest & Disease Management	()	()	()	()	()	()	()	()	()	
Harvest/Post Harvest	()	()	()	()	()	()	()	()	()	
Food Preservation/Processing	()	()	()	()	()	()	()	()	()	
Agri. Machinery Operation	()	()	()	()	()	()	()	()	()	
Group/Account management	()	()	()	()	()	()	()	()	()	
Other ()	()	()	()	()	()	()	()	()	()	

5-1-2 How do you attended family member evaluate these Training/Guidance? (Enter all that apply)

Issue	DAO/Gewog	RDC	AMC	NPPC	Other RGB	Japan/JICA	UN/WB	Other Donor	NGO	Others (Specify)
Vegetable production	()	()	()	()	()	()	()	()	()	()
Vegetable seed production	()	()	()	()	()	()	()	()	()	()
Fruit Nursery production	()	()	()	()	()	()	()	()	()	()
Fruit Orchard management	()	()	()	()	()	()	()	()	()	()
Soil Management	()	()	()	()	()	()	()	()	()	()
Irrigation Management	()	()	()	()	()	()	()	()	()	()
Pest & Disease Management	()	()	()	()	()	()	()	()	()	()
Harvest/Post Harvest	()	()	()	()	()	()	()	()	()	()
Food Preservation/Processing	()	()	()	()	()	()	()	()	()	()
Agri. Machinery Operation	()	()	()	()	()	()	()	()	()	()
Group/Account management	()	()	()	()	()	()	()	()	()	()
Other ()	()	()	()	()	()	()	()	()	()	()

5-1-3 If you selected [4. Not Useful], please give reason

Issue	DAO/Gewog	RDC	AMC	NPPC	Other RGB	Japan/JICA	UN/WB	Other Donor	NGO	Others (Specify)
Vegetable production	()	()	()	()	()	()	()	()	()	()
Vegetable seed production	()	()	()	()	()	()	()	()	()	()
Fruit Nursery production	()	()	()	()	()	()	()	()	()	()
Fruit Orchard management	()	()	()	()	()	()	()	()	()	()
Soil Management	()	()	()	()	()	()	()	()	()	()
Irrigation Management	()	()	()	()	()	()	()	()	()	()
Pest & Disease Control	()	()	()	()	()	()	()	()	()	()
Food Preservation/Processing	()	()	()	()	()	()	()	()	()	()
Agri. Machinery Operation	()	()	()	()	()	()	()	()	()	()
Group/Account management	()	()	()	()	()	()	()	()	()	()
Other ()	()	()	()	()	()	()	()	()	()	()

5-2 Training Requirements

If you have opportunity to attend Training/Guidance on Vegetable and/or Fruit/Nuts cultivation, on what particular topic do you want to attend

Knowledge/Skill	1. Very Much Needed, 2. Needed, 3: If there is Chance			Fruit/Nut Cultivation		
	Need	Needfulness	Particular (If any)	Need	Needfulness	Particular (If any)
Variety and character of Crops	☐	()		☐	()	
Nursery Management	☐	()		☐	()	
Planting/Transplanting/Layout	☐	()		☐	()	
Orchard Management (Pruning/Training)	☐	()		☐	()	
(Grafting/Top-working)	☐	()		☐	()	
(Fruit Thinning)	☐	()		☐	()	
Soil Management	☐	()		☐	()	
Water Management	☐	()		☐	()	
Pest & Disease Control	☐	()		☐	()	
Wild Animal Control	☐	()		☐	()	
Harvest/Post Harvest	☐	()		☐	()	
Seed Production	☐	()		☐	()	
Seed Processing/quality manage.	☐	()		☐	()	
Preservation/Processing	☐	()		☐	()	
Marketing	☐	()		☐	()	
Farmer's Group management	☐	()		☐	()	
Other ()	☐	()		☐	()	

Annexure 3

Questionnaire for Baseline Survey of IHPP/JICA (Research & Extension)

Date

1 Personal Information

1-1 General Information

Name					Gender	Male ☐	Female ☐
Designation					Age		
Organization					Mobile No.		
Gewog					E-mail		
Dzongkhag					FAX		
No. of years in service		No. of years in present posing		Office Tel.			
Education;	Certificate ☐	Diploma ☐	Bachelor ☐	Master ☐	PhD ☐	Major:	
Profession							

1-2 Knowledge/ Technical Skill on Horticulture Production

1-2-1 What is your most confident technical field? (Tick 3 most in below)

1-2-2 Have you ever attended Training/Workshop related to horticulture production?

Yes	☐	No	☐
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1-2-3 If Yes, where and what topic of the Training/Workshop.

<Mode> 1: Lecture, 2: Practical, 3: Lecture & Practical, 4: Observation, 5: Others (Particular) (Tick and rate all that apply)

Topics/subjects	Self Confidence	Training/Work Shop							
		In Country	India	Nepal	Japan	Other Asia	Australia	Europe	Other (Particular)
Vegetable production	()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()
Vegetable seed production	()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()
Fruit Nursery production	()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()
Fruit Orchard management	()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()
Soil Management	()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()
Irrigation Management	()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()
Pest & Disease Control	()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()
Harvest/Post Harvest	()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()
Preservation/Processing	()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()
Marketing	()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()
Farmer's Group management	()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()
Other ()	()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()	☐ ()

2 Extension/Research activities

2-1 Important Issue

2-1-1 In order to promote commercial Horticulture cultivation and increase its production, what are the important issues?

2-1-2 Among these issues, on what issue are you involved?

<Importance rate > 1: Most important, 2: Very impotent, 3: Important

(Tick and rate all that apply)

Issue	Importance for Veget.	Assignment	Importance for Fruit/Nut	Assignment
Knowledge/Technical skill of concerned officials	☐ ()	☐	☐ ()	☐
Knowledge/Technical skill of farmers	☐ ()	☐	☐ ()	☐
Quality Seed/Seedling	☐ ()	☐	☐ ()	☐
Quantity Seed/Seedling	☐ ()	☐	☐ ()	☐
Improved Variety Crops	☐ ()	☐	☐ ()	☐
Soil Management	☐ ()	☐	☐ ()	☐
Pest & Disease Control	☐ ()	☐	☐ ()	☐
Wild Animal Control	☐ ()	☐	☐ ()	☐
Harvest/Post Harvest	☐ ()	☐	☐ ()	☐
Preservation/Processing	☐ ()	☐	☐ ()	☐
Irrigation	☐ ()	☐	☐ ()	☐
Farm Mechanization	☐ ()	☐	☐ ()	☐
Marketing	☐ ()	☐	☐ ()	☐
Farmer's Group activities	☐ ()	☐	☐ ()	☐
Other ()	☐ ()	☐	☐ ()	☐

2-2 Support to Farmers

2-2-1 In order to promote commercial Horticulture cultivation and increase its production, what kind of support do you/your organization provide to the Farmers? (Enter all that apply)

2-2-2 How do you evaluate the effectiveness of these supports.

<Effectiveness Rate> 1: Very Effective, 2: Effective, 3: Neutral, 4: Not Effective, 5: N.A

2-2-3 If you chose [4: Not Effective] in 2-2-2, please give reasons

<Reason> 1: Not Relevant, 2: Not Practical/Applicable, 3: Wrong Timing/Target, 4. Other, 5. N.A.

(Tick and rate all that apply)

Kind of Supports	For Vegetable Cultivation			For Fruit/Nut Cultivation		
	Support Extended	Effectiveness	Reason if Not Effect.	Support Extended	Effectiveness	Reason if Not Effect.
Training/Guidance	☐	()	()	☐	()	()
Seed/Seedling	☐	()	()	☐	()	()
Fertilizer	☐	()	()	☐	()	()
Chemical	☐	()	()	☐	()	()
Green House/Plastic	☐	()	()	☐	()	()
Machinery/Tool	☐	()	()	☐	()	()
Irrigation Facilities	☐	()	()	☐	()	()
Electric Fence	☐	()	()	☐	()	()
Fund	☐	()	()	☐	()	()
Others ()	☐	()	()	☐	()	()

2-3 Promoting/Potential Horticultural Crops

2-3-1 List five (5) Vegetables and Fruits/Nuts that your are promoting and/or find potential. Then give reasons.

(Select max 5 Vegetable and Fruit/Nut, then select and tick the most appropriate reason)

Promoted Crops	1: Easy to Cultivate	2: High Yield	3: Pest/ Disease Resistance	*4: Easy to Market/sell	5: Competitive advantage	*6: Government Policy	7: Others (Particular)
<Vegetable>	☐	☐	☐	☐	☐	☐	☐ ()
	☐	☐	☐	☐	☐	☐	☐ ()
	☐	☐	☐	☐	☐	☐	☐ ()
	☐	☐	☐	☐	☐	☐	☐ ()
	☐	☐	☐	☐	☐	☐	☐ ()
	☐	☐	☐	☐	☐	☐	☐ ()
<Fruit/Nut>	☐	☐	☐	☐	☐	☐	☐ ()
	☐	☐	☐	☐	☐	☐	☐ ()
	☐	☐	☐	☐	☐	☐	☐ ()
	☐	☐	☐	☐	☐	☐	☐ ()
	☐	☐	☐	☐	☐	☐	☐ ()
	☐	☐	☐	☐	☐	☐	☐ ()

*4: Such as high demand/price, long shelf life and transport, etc.

*6: Such as off season product (Scarcity value; high price).

2-3-2 In order to promote the above mentioned crops, what kind of approach would be the most effective considering your organization's capacity and available resources.

<Effectiveness> 1: Very Effective, 2: Effective, 3: Neutral

(Select max 3, then rate effectiveness)

Research-Extension Approaches/Model	Tick	Effectiveness
Provide possible materials with Equal opportunity (scattered)	☐	()
Foster Model Farm by Systematic Training and provide needed or materials to the Selected Farmers	☐	()
Integrated Fruits and vegetable development model	☐	()
Focus Village/Group Approach	☐	()
Field days and demonstrations	☐	()
Crop competition and displays	☐	()
Others if any ()	☐	()
Others if any ()	☐	()

2-4 Training/Guidance to Farmers

2-4-1 In order to promote commercial Horticulture cultivation and increase its production, what are the most needed/recommended Knowledge and Skill to be provided to the Farmers? (Select 5 most needed/recommended Knowledge/Skill in below)

2-4-2 Have you ever provided Training/Guidance on the Knowledge/Skills listed below to the Farmers?

Yes	☐	No	☐
-----	--------------------------	----	--------------------------

2-4-3 1) If Yes, on what Knowledge/Skills training/guidance have you provided?

2) And rate its Effectiveness and your Confidence in terms of your Knowledge/Skills..

<Effectiveness> 1: Very Effective, 2: Effective, 3: Neutral, 4: Not Effective, 5:N.A

< Confidence> 1: Very Confident, 2: Confident, 3: Neutral, 4: Not Confident, 5:N.A

(Tick and rate all that apply)

Knowledge/Skill	Vegetable Cultivation				Fruit/Nut Cultivation			
	Knowledge	Skill	Effectiveness	Confidence	Knowledge	Skill	Effectiveness	Confidence
Variety and character of Crops	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
Nursery Management	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
Planting/Transplanting	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
Orchard Management (Pruning/Training)	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
(Grafting/Top-working)	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
(Fruit Thinning)	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
Soil Management	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
Water Management	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
Pest & Disease Control	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
Wild Animal Control	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
Harvest/Post Harvest	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
Seed Production	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
Seed Processing/quality management	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
Food Preservation/Processing	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()
Other ()	☐ ()	☐ ()	()	()	☐ ()	☐ ()	()	()

2-5 Reference material

2-5-1 Please list max three (3) References/Material (i.e. Reports, Manual, Hand Book, Brochure) you use for your work.

2-5-2 How do you evaluate these References/Material?.

<Usefulness Rate> 1: Very Useful, 2: Useful, 3: Neutral, 4. Not Useful, 5:N.A

2-5-3 If you evaluated **[4: Not Useful]** in 2-2-3, please give reason

<Reason> 1: Not Relevant, 2. Not Practical/Applicable, 3. Other, 4. N.A.

Subject	Name of Reference/Material	Usefulness	Reason if Not Useful
Vegetable production		()	()
		()	()
		()	()
Vegetable seed production		()	()
		()	()
		()	()
Fruit Nursery production		()	()
		()	()
		()	()
Fruit Orchard management		()	()
		()	()
		()	()
Soil Management		()	()
		()	()
		()	()
Irrigation Management		()	()
		()	()
		()	()
Pest & Disease Control		()	()
		()	()
		()	()
Harvest/Post Harvest		()	()
		()	()
		()	()
Preservation/Processing		()	()
		()	()
		()	()
Marketing		()	()
		()	()
		()	()
Farmer's Group management		()	()
		()	()
		()	()
Other ()		()	()
		()	()
		()	()

3 Problems/Constraints

3-1 Do you have any major problem/constraint to perform your assignment/duty?

1: Yes

☐

2: No

☐

3-1-1 If yes, what are the problems/constraints? (Tick max 5 major problems/constraints, and enter details if any)

Problem/Constraint	Tick	Details of the problem/constraint
Limited Knowledge/Technical Skill	☐	
Limited Information/Communication	☐	
Limited Equipment/Tool/*Materials	☐	
Limited Research/Extension **Materials	☐	
Limited Budget	☐	
Limited Man power	☐	
Limited Transportation	☐	
Limited Time	☐	
Ad-hoc Assignment	☐	
Unco-operative Farmers	☐	
Water shortage	☐	
Poor Soil Fertility	☐	
Availability of Seed/Seedling	☐	
Poor Quality of Seed/Seedling	☐	
Uncontrollable of Pest/Disease	☐	
Wild Animal Damage	☐	
Natural Hazards	☐	
Other	☐	

* Such as Fertilizer, Chemical, etc.

** Such as Text book, Report, Manual, Handbook, Leaflet, Poster

3-1-2 If you select "**Limited Knowledge/Technical Skill**", on what particular topic do you need to acquire?

<Needfulness>

1: Very Much Needed, 2: Needed, 3: If there is Chance

(Enter on Max 5 Issue that apply)

Knowledge/Skill	Vegetable Cultivation			Fruit/Nut Cultivation		
	Knowledge	Skill	Particular (If any)	Knowledge	Skill	Particular (If any)
Variety and character of Crops	☐ ()	☐ ()		☐ ()	☐ ()	
Nursery Management	☐ ()	☐ ()		☐ ()	☐ ()	
Planting/Transplanting/Layout	☐ ()	☐ ()		☐ ()	☐ ()	
Orchard Management (Pruning/Training)	☐ ()	☐ ()		☐ ()	☐ ()	
(Grafting/Top-working)	☐ ()	☐ ()		☐ ()	☐ ()	
(Fruit Thinning)	☐ ()	☐ ()		☐ ()	☐ ()	
Soil Management	☐ ()	☐ ()		☐ ()	☐ ()	
Water Management	☐ ()	☐ ()		☐ ()	☐ ()	
Pest & Disease Control	☐ ()	☐ ()		☐ ()	☐ ()	
Wild Animal Control	☐ ()	☐ ()		☐ ()	☐ ()	
Harvest/Post Harvest	☐ ()	☐ ()		☐ ()	☐ ()	
Seed Production	☐ ()	☐ ()		☐ ()	☐ ()	
Seed Processing/quality manage	☐ ()	☐ ()		☐ ()	☐ ()	
Preservation/Processing	☐ ()	☐ ()		☐ ()	☐ ()	
Marketing	☐ ()	☐ ()		☐ ()	☐ ()	
Farmer's Group management	☐ ()	☐ ()		☐ ()	☐ ()	
Other ()	☐ ()	☐ ()		☐ ()	☐ ()	

4. Expectations from IHPP-JICA/Bajo

With understanding that IHPP is a technical cooperation project, what kind of technical support (Training/Guidance) do you expect?
