

PRODUCTION PACKAGE FOR RAPESEED AND MUSTARD

Introduction

We generally refer to two species of *Brassica* as Mustard in Bhutan. Actually, mustard is *Brassica juncea*, whereas *Brassica campestris* is known as Rapeseed. There are some differences at the species level. What we commonly grow in the country is rapeseed. Rapeseed is a herbaceous annual plant. The plant is shorter in height (45-150 cm) than mustard. The roots are more or less confined to surface layers with an extensive lateral spread. The stem is usually covered with a waxy deposit. Leaves are borne sessile and are glabrous and hairy. Fruits are thicker than those of mustard and are laterally compressed, with a beak one-third to half their length. Seeds are either yellow or brown with a smooth seed coat. Mustard plants are tall (90-200 cm), erect and more branched. The plant bears normally long and tapering roots. The leaves are not dilated at the base and clasping as in the case of rape, but are stalked, broad and pinnatifid. The pods are slender, strongly ascending or erect with short and stout beaks. The colour of seed is brown or dark brown.



Uses

The oil content varies from 37 to 49%. The seed and oil are used as condiment in the preparation of pickles and for flavouring curries and vegetables. The oil is utilized for human consumption in cooking and frying purposes. It is also used in the preparation of hair oils and medicines. It is used in the manufacture of greases. The oil cake is used as feed and manure. Green stem and leaves are a good source of green fodder for cattle. The leaves of young plants are used as green vegetables as they supply sulphur and minerals in the diet. In the tanning industry, mustard oil is used for softening leather.

Climatic requirements

Rape seed and mustard are crops of tropical as well as temperate zones and require somewhat cool and dry weather for satisfactory growth. They require a fair supply of soil moisture during the growing period and a dry clear weather at the time of maturity. Cool temperature, clear dry weather with plentiful of bright sun shine accompanied with adequate soil moisture increases the oil yield. Excessive cold and frost are harmful to the crop. Rapeseed and mustard are long day in photo-periodic response. They require an annual precipitation of 40-100 cm.

Soils

Rape seed and mustard are capable of growing under a wide range of soil conditions varying from sandy loam to clay loam soils but they thrive best on light loam soils. They neither tolerate waterlogging conditions nor do well on heavy soils. Plants can tolerate moderate salinity reasonably well but a soil having neutral pH is ideal for their proper growth and development. Soils with pH <5.0 and >9.0 are not suitable for these crops. Soils having pH 6.0-7.5 is ideal for their proper growth and development.

Land preparation

A clean and well pulverised seedbed of good tilth is needed for better germination. The land should be well prepared first by ploughing deep with soil turning plough, followed by two cross harrowings. Each ploughing should be followed by planking so that the soil is well pulverised and levelled. Care should be taken to see that weeds and stubbles are well removed from the field and the soil contains adequate moisture to ensure good germination.

Varieties

There are 4 improved varieties of rapeseed mustard released and recommended for both wetland and dryland systems. These varieties are: T-9, M-27, Bajo Peka-1 (BSA) and Bajo Peka-2 (PT-30). Bajo Peka-1 is a longer duration variety and recommended for dryland system under maize based farming, while the rest are for wetland system under rice-based farming.



Seeds and Sowing

Maintenance of optimum plant population is essential for getting good harvests. The seed rate depending on type of crop varies from 4-10 kg/ha. Crop should be thinned 15-20 days after sowing to maintain plant-to-plant distance of 10-15 cm.

Time of Sowing

Planting time is the single most important variable affecting the seed yield of rape seed and mustard to a great extent. Since the rate of development of oil in seed is greatly influenced by the variation in atmospheric temperature, humidity, and other biotic factors, sowing either too early or too late have been reported to be harmful. Delay in planting reduces the yield on account of its depressing effect on the plant growth, flowering duration, seed formation and seed size. Therefore, for getting good yields of rape and mustard timely sowing is a must. If sowing is delayed, there is great danger of attack of aphids on this crop. In the maize based system, rapeseed mustard should be sown in August-September after harvest of maize. In the rice-based system, it should be sown in October-November immediately after the rice harvest.

Manures and Fertilizers

Rape seed and mustard respond well both to organic and inorganic manures. If available, apply 10-15 tons of farm yard manure or compost at the time of field preparation. These crops show good response to chemical fertilizers. For good harvest, apply 40-60 kg nitrogen, 30 kg P₂O₅ and 20 kg K₂O per hectare. The quantity of phosphorous and potash should be based on soil test recommendations. Split application of nitrogen is recommended. Under irrigated conditions half of the nitrogen and full dose of phosphorous and potash should be applied as basal dose. The remaining half of the nitrogen should be applied at the time of first irrigation. Rape seed and mustard have higher requirement for sulphur, therefore, nitrogen should preferably be applied through ammonium sulphate and phosphorous from single Superphosphate.

Water management

Rape seed and mustard are usually raised as rainfed on the conserved moisture from monsoon rains. Good yields can be achieved if the fields are banded and leveled before the monsoon and ploughed two to three times during the monsoon season, bulky organic manures are applied in soil to improve moisture storage capacity of soil and evaporation losses of moisture are minimized by the use of inter-cultivation or mulching on the soil surface. Rape seed and mustard respond to irrigation as well. Application of even a small quantity of water has shown very encouraging results in these crops. Two irrigations at pre-bloom (30 DAS) and pod filling stages (60-65 DAS) are beneficial.

Diseases and their management

A number of diseases have been recorded on these crops. Of these, Alternaria blight, downy mildew and white blister or rust are the most important diseases which take a heavy toll of the crop.

Alternaria Blight

The disease is caused by a fungus, *Alternaria brassicae*. The pathogen perpetuates through seed and affected plant portion in the soil. The disease is characterized by the appearance of concentric black spots on leaves, stem and pods. In years of severe outbreak, pods turn black in colour and may also rot. Such pods contain shriveled, undersized seeds.



Control Measures

1. Use of healthy seeds for sowing.
2. Spray Dithane M-45 at the rate of 2 kg in 1000 litres of water per hectare at 10 days interval as soon as the symptoms start appearing on the plants.
3. Collect and burn the affected plant portions after the harvest of the crop.

Downy Mildew

This disease is caused by a fungus, *Peronospora brassicae*. In the disease affected plants, yellow, irregular spots appear on the upper surface of the leaves and white growth is visible on the under surface opposite to spots. If the attack is severe, inflorescence is also affected. The affected



inflorescence is malformed, twisted and covered with a white powder. No pods are produced on such inflorescence.

Control Measures

1. Use healthy seeds for sowing.
2. Spray the crop with 0.2% Zineb as soon as the symptoms are noticed and repeat the spray two to three times at 10 days interval.

White Blister/Rust

This disease is caused by the fungus, *Albugo candida*. This disease can be a serious menace if it



occurs along with downy mildew. The disease is characterized by white raised blisters on leaves, stem, petiole and floral parts. These blisters burst and liberate a white powder. There is much deformity of the floral parts. Flowers get malformed and become sterile.

Control Measures

1. Use healthy seeds for sowing.
2. Spray the crop with 0.2% Zineb as soon as the symptoms are noticed and repeat the spray if needed at 10 days interval.
3. Keep the field free from weeds.

Club root

Disease symptoms

- Affected plants remain stunted.
- Tiny nodules to large club shaped outgrowths develop in root system.
- Leaves turn pale green or yellow followed by wilting and under severe conditions the plants die
- The pathogen survives in the soil as resting spores and these spores act as primary source of inoculum.
- Humid weather and high soil moisture favour disease development.



Control measures

- Use long rotations – grow rapeseed mustard not more frequently than once every four years
- Select clubroot-resistant varieties
- Practice good sanitation to restrict the movement of possibly contaminated material - this approach will help reduce the spread of other diseases, weeds and insects.

Insects Pests

The crop is subject to the attack of insect pests right from the seedling stage to the pod formation stage. The major insect pests are as follows:

Mustard Sawfly

This is the most important seedling pest of rape seed and mustard. The adult fly is orange coloured with black head. Since the female has saw-like ovipositor, it is called as sawfly. The larvae of this pest feed on the leaves of rape seed and mustard making holes. Sometimes they eat up entire lamina of leaf leaving behind the midribs. It is a sporadic pest and in certain years it becomes so serious that plants are defoliated completely. It appears in the month of October and its peak season of activity is in November. The population disappears suddenly on the onset of winter.



Control Measures

- Dusting with 5 or 10% BHC at the rate of 20-25 kg per hectare controls the pest effectively.

Mustard Aphid

It is a very serious pest and is the main limiting factor in the production of rape seed and mustard. Both nymph and adult suck the sap of the tender leaves, twigs, stem, inflorescence and pods by means of piercing and sucking type of mouth parts. The aphids are green small insects about 2 mm in size. The affected leaves usually curl and in case of severe infestation the plant wilt and dry. Due to the attack on the inflorescence, the pod formation is adversely affected. The aphids also secrete 'honey dew' on which black mould develops. This mould adversely affects the normal physiological activities of the plants.



Control Measures

- As the cold and cloudy weather favours the pest multiplication, sowing the crop earlier than the normal sowing time escape the pest attack.
- Spraying of crop with insecticides like Rogor 30 EC at the rate of one litre per hectare in 1000 litres of water are quite effective in controlling these insects.

Cabbage Butterfly

The full grown larvae of this pest are 3 to 4 cm in length with bright yellowish-green colour and small hairs on the dorsal side. The larvae of this pest feed voraciously on the leaves, branches and pods of the crop. The plants are defoliated with the result the small plants die while the grown up plants suffer in growth and yield.



Control Measures

- The caterpillars in early stage should be controlled by hand picking and killing.
- Spraying with any available insecticides controls the pest.

Harvesting and Threshing

As soon as the pods turn yellowish-brown, harvest the crop. The crop is liable to shattering, hence it should be harvested just before the pods open in order to avoid losses. The harvested crop should be stacked in threshing floor for five to six days before threshing. Threshing is very easy with the help of sticks. The pods easily shatter and give away seeds. The threshed seed is separated from the husk with the help of slow moving natural air current. Cleaned seed must be dried in the sun for four to five days or till the moisture content comes down to 8 percent.