

# ON-STATION SUNFLOWER GERMPLASM MAINTENANCE

## (ARDSC, TSIRANG)

### Introduction



Germplasm maintenance is a critical aspect of agricultural research and crop improvement, focusing on the preservation and management of genetic diversity within plant populations. Maintaining diverse germplasm ensures the availability of valuable traits such as disease resistance, stress tolerance, and yield potential, which are essential for breeding programs aimed at developing resilient and high-performing crop varieties. Proper germplasm maintenance involves careful conservation practices, including seed storage, regeneration, and characterization, to prevent genetic erosion and maintain the integrity of the genetic material over time. This diversity not only supports sustainable agriculture by providing a genetic reservoir for adaptation to changing environmental conditions but also enhances food security by enabling continuous crop improvement. Emphasizing individual variety within germplasm collections allows researchers to identify unique traits and adapt crops to specific agro-ecological zones, thereby maximizing productivity and farmer resilience. Overall, germplasm maintenance is indispensable for safeguarding plant genetic resources and underpinning future advances in crop breeding and agricultural sustainability.

This report summarizes the performance of three germplasm treatments—Indian, Japanese, and Local (Bumthang)—based on field trial observations. The evaluation covers germination, flowering, plant growth, grain characteristics, yield, and maturity. The purpose is to identify strengths and weaknesses of each treatment in simple terms for practical use.

### Comparative Table of Germplasm Performance

| Trait / Parameter      | Indian | Japanese | Local (Bumthang) |
|------------------------|--------|----------|------------------|
| Germination (Days)     | 7      | 7        | 9                |
| 50% Flowering (Days)   | 62     | 62       | 128              |
| Flower Size (cm)       | 22     | 24       | 30               |
| Plant Height (cm)      | 161    | 164      | 255              |
| 1000 Grain Weight (gm) | 55.4   | 67.9     | 75.8             |
| Seed Yield (kg/6m²)    | 1.435  | 0.733    | 1.15             |
| Yield (Kg/acre)        | 967    | 495      | 775              |
| Days to Maturity       | 102    | 106      | 126              |

## Key Observations

- Indian Treatment
  - Germination was quick (7 days).
  - Flowering occurred early (62 days).
  - Moderate flower size (22 cm).
  - Plant height was medium (161 cm).
  - Grain weight was lower compared to others (55.4 gm).
  - Produced the highest yield per acre (967 kg).
  - Maturity was relatively fast (102 days).
- Japanese Treatment
  - Germination was also quick (7 days).
  - Flowering was early (62 days).
  - Slightly larger flowers (24 cm).
  - Plant height was medium (164 cm).
  - Grain weight was better than Indian (67.9 gm).
  - Yield was lowest (495 kg/acre).
  - Maturity took slightly longer (106 days).
- Local (Bumthang) Treatment
  - Germination was slower (9 days).
  - Flowering was very late (128 days).
  - Largest flower size (30 cm).
  - Tallest plants (255 cm).
  - Heaviest grains (75.8 gm).
  - Yield was moderate (775 kg/acre).
  - Maturity was longest (126 days).

## Summary and Recommendations

### Strengths

- **Indian:** Fast growth, early maturity, and highest yield. Suitable for farmers needing quick harvests and higher productivity.
- **Japanese:** Good grain weight and early flowering, but yield is low. Could be useful for breeding programs focusing on grain quality.
- **Local (Bumthang):** Strong plant growth, large flowers, and heavy grains. Shows potential for resilience and grain quality improvement.

### Weaknesses

- **Indian:** Grain weight is relatively low.
- **Japanese:** Yield is poor despite good grain weight.
- **Local (Bumthang):** Late flowering and long maturity period may limit adoption in short-season areas.

### Recommendations

- Indian germplasm is best for immediate farmer use due to high yield and short maturity.
- Japanese germplasm may be used for crossing with other varieties to improve grain weight.
- Local germplasm is valuable for long-term breeding programs aiming at resilience and grain quality.

## Conclusion

This evaluation highlights that each germplasm has unique strengths. Indian is best for productivity, Japanese for grain quality traits, and Local (Bumthang) for resilience and plant Vigor. Further research in farmers' fields will not only help in observing the real-world performance of each variety under diverse conditions, but also in assessing which germplasm is most suitable for specific agro-ecological zones, thereby guiding both farmer adoption and future breeding efforts.

### Submitted by

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