

## CULTIVATION OF BASMATI RICE

*Basmati* occupies a special status in rice cultivation. Its rice is known for excellent cooking and eating qualities. However, *Basmati* varieties occupy about 20% per cent rice area in the State.

To obtain satisfactory yield of *Basmati* varieties the following package of practices are recommended for adoption :

### **Important Points :**

- \* Restrict to timely sowing and transplanting schedule of basmati varieties for better quality rice.
- \* Avoid mixing of varieties.
- \* Monitor the insect-pest population/damage and use recommended control measures.
- \* All the basmati/aromatic varieties, especially Pusa Basmati 1121 are susceptible to foot rot disease. Use only disease free seed.
- \* Use seed treatment to avoid seed borne diseases.

### **Climatic Requirements :**

Like semi-dwarf rice varieties, *Basmati* varieties require prolonged sunshine, high humidity and assured water supply. *Basmati* varieties with superior cooking and eating characteristics can be produced if the crop matures in relatively cooler temperature. The high temperature during grain filling period reduces the cooking and eating quality features of basmati rice like kernel elongation and non-stickiness of cooked rice.

### **Rotations:**

- (i) Basmati rice-Wheat\*/Sunflower
- (ii) Basmati rice-Wheat-Sathi maize/Summer moong.
- (iii) Basmati rice-Mentha
- (iv) Basmati rice-Berseem (seed)
- (v) Basmati rice-celery-bajra (fodder)

### **Improved Varieties :**

***Punjab Basmati 2 (2008)*** – This variety is about 125 cm tall and is weakly photoperiod sensitive. It possesses extra long slender grains with excellent cooking and eating qualities. Grains of this variety are strongly scented. Grains almost double upon cooking, are non sticky and soft to eat. It matures in about 140 days after seeding. Its average yield is 12.6 quintals of paddy per acre.

***Super Basmati (2003)*** – This variety is about 113 cm tall and is weakly photo period sensitive. It performs best under medium fertility conditions. It possesses extra long, super fine grains with excellent cooking quality and strong aroma. The cooked rice is non-sticky and soft to eat. It matures in about 145 days after seeding. Its average yield is 14 quintal of paddy per acre.

***Basmati 386 (1995)*** – This variety is about 180 cm tall and is photo period sensitive. It performs best under medium fertility conditions. Its grains are extra-long, superfine and aromatic. Grains elongate almost double on cooking. The cooked rice is non-sticky and soft to eat. It matures in about 155 days from seeding. Its average yield is 9 quintal paddy per acre.

***Pusa Basmati No. 1 (1990)*** – This variety is about 100 cm tall and is photo period insensitive. It performs best under high fertility soils. Its grains are superfine and elongate well upon cooking. Its rice has mild aroma. The cooked rice is non-sticky and soft to eat. It matures in about 140 days. Its average yield is about 16 quintal of paddy per acre.

**Basmati 370** – This variety is about 165 cm tall, photo period sensitive and lodge under high fertility conditions. It does best on average fertility soils. Its grains are superfine, highly aromatic and elongate almost double upon cooking. The cooked rice is non sticky and soft to eat. It matures in about 150 days. Its average yield is 12 quintal paddy per acre.

**Pusa Basmati 1121 (2008)** : It is about 120 cm tall. It possesses extra long slender grains with good cooking quality. It has longest cooked rice length among all the aromatic rice varieties recommended for Punjab. It is photoperiod insensitive and matures in about 137 days after seeding. It yields on an average 13.7 quintals of paddy per acre.

#### **Aromatic Rice**

It includes both basmati and non basmati rice varieties. They have one or more of other attributes of the basmati rice but not all of them.

**Punjab Mehak 1 (2009)** : It is an aromatic rice variety. It is photoperiod in sensitive and is about 100 cm tall. It possesses extra long slender, clear translucent grains with strong aroma. It has excellent cooking and eating qualities. The cooked rice is non-sticky and soft to eat. It matures in about 125 days after seeding. It is resistant to most of the pathotypes of bacterial blight prevalent in Punjab. Its average paddy yield is about 17 quintal per acre.

#### **Agronomic Practices :**

Agronomic practices like land preparation, seed rate, seed treatment, method of nursery raising, weed control etc. are the same for Basmati varieties as for other semi-dwarf varieties. However, some of the agronomic practices which require special mention are discussed below :

**Time of Nursery Sowing :** Basmati 386 and Basmati 370 are photosensitive and mature late, therefore, nursery of these varieties may be sown in the second fortnight of June. Nursery of Punjab Mehak 1, Punjab Basmati 2, Pusa Basmati 1121, Super Basmati and Pusa Basmati No. 1 may be sown in the first fortnight of June.

#### **Unpuddled Direct Seeded Basmati/Aromatic Rice**

Direct sowing of basmati rice can also be practised with the adoption of following points to make this technology a success :

1. Sow basmati rice by direct seeding only in medium to heavy textured soils.
2. Proper control of weeds is essential for raising a healthy crop of direct seeded basmati rice.
3. Ensure its proper establishment by sowing with tractor drawn rice drill.

Direct sowing of Punjab Mehak 1, Punjab Basmati 2, Pusa Basmati 1121, Super Basmati and Punjab Basmati No. 1 can be done during second fortnight of June whereas Basmati 386 and Basmati 370 can be sown during first fortnight of July by using 8 to 10 kg seed per acre with tractor drill at 20 cm row spacing. For controlling weeds, apply Stomp 30 EC (pendimethalin) @ 1.0 litre/ acre within two days of sowing. If needed, apply Nominee Gold 10 SC (bispyribac) 100 ml per acre/ Segment 50 DF (Azimsulfuron) @ 16 g per acre at 30 to 35 days after sowing. Spray these herbicides uniformly by mixing them in 150 to 200 litres of water per acre and use flat fan/flood jet nozzle for spray. Use Nominee Gold 10 SC when the crop is infested with *swank* and paddy *mothas* are present in the field. Apply nitrogen and phosphorous fertilizers as per recommendation for puddled transplanted basmati rice. To fulfill the water need of the crop, apply irrigation at 5 to 7 days interval depending upon the soil type. The interval may be adjusted with rainfall. Stop irrigation 10 days before harvesting.

**Time of Transplanting :** The time of transplanting is a crucial factor in determining the yield and quality of the *Basmati*/aromatic varieties. *Basmati* 386 and Basmati 370 if transplanted too early in the season have a prolonged vegetative phase resulting into a tall and leafy crop. Such a

crop is more prone to lodging because of excessive height and vegetative growth. To check lodging, lopping of the upper half of crop canopy (Basmati 386 and Basmati 370) after 45 days of transplanting may be done. Further it would also reduce stem borer damage. Being photoperiod sensitive these varieties flower when a specific daylength is reached. The early transplanted crop also experiences high temperature at flowering which lowers its cooking quality. Optimum time of transplanting for Basmati 386 and Basmati 370 is second fortnight of July. Punjab Mehak 1, Punjab Basmati 2, Pusa Basmati 1121, Super Basmati and Pusa Basmati No. 1 may be transplanted in first fortnight of July.

**Age of Seedlings :** Seedlings of Basmati/aromatic rice varieties are ready for transplanting when they attain 5 to 6 leaf stage or are 25-35 days old after sowing. Longer stay of seedlings in the nursery bed results into node formation which reduce tillering and yield in Basmati varieties.

**Method of Transplanting :** Irrigate the nursery before uprooting and wash them to remove mud. Transplant two seedlings per hill in lines at 20 x 15 cm (33 hills/sq. metre) during the optimum period in a well puddled field. In the late transplanted crop the spacing may be reduced to 15x15 cm (44 hills/sq. metre) to cope the reduction in yield.

**Fertilizer Application :** High doses of nitrogen application to Basmati varieties cause excessive vegetative growth and plant height. This makes the crop more prone to lodging thus resulting into poor yield. Apply 75 kg of superphosphate per acre before last puddling (this application may be skipped if the recommended dose of phosphorus has been applied to the preceding wheat crop). Broadcast 18 kg urea/acre to Basmati 386 & Basmati 370 : 36 kg urea/acre to Punjab Mehak 1, Super Basmati, Punjab Basmati 2, Pusa Basmati 1121 & Pusa Basmati No. 1 54 Kg urea acre to *Punjab Mehak*, in two equal splits. The first dose should be applied three weeks and the second, six weeks after transplanting. If possible, apply the nitrogenous fertilizer when water is not standing in the field. Irrigate on third day of the application of fertilizer.

**Irrigation :** Keep the water standing continuously for two weeks after transplanting. Afterwards apply irrigation two days after the ponded water has infiltrated into the soil. The crop should not suffer any water stress particularly during flowering. Stop impounding water about a fortnight before harvesting to facilitate easy harvesting and timely sowing of succeeding *Rabi* crop.

## **Plant Protection Measures**

### **1. Insect pests :**

**Stem borers :** Basmati/aromatic rice varieties are highly susceptible to stem borers namely yellow stem borer, white stem borer and pink stem borer. The yellow and white stem borers are serious up to flowering stage. The pink stem borer generally appears late and is more serious at/after maximum tillering stage when its damage affects grain formation. It is, therefore, necessary to monitor the crop regularly for stem borer damage. As and when there are more than 2% dead hearts (economic threshold level) in the field, apply the insecticides to manage the borers. The stem borers can be controlled by spraying Monocil 36 SL (monocrotophos) @ 560 ml or one litre of Coroban/Dursban/Lethal/Chlorguard/Durmet/Classic/Force 20 EC (chlorpyrifos) or 15g Fipronil 80% WG (fipronil) in 100 litres of water per acre. These insects can also be controlled by applying 10 kg Padan/Caldan/Kritap/Sanvex/Nidan/Marktap 4G (cartap hydrochloride) or 6 kg Regent/Mortel 0.3G (fipronil) or 5 kg Foratox 10 G (phorate) or 4 kg Dursban 10G (chlorpyrifos) per acre in standing water. Padan/Kritap/Caldan/Sanvex/Nidan/Marktap 4 G/Regent/Mortel 0.3G/Dursban 10G/ Fipronil 80% WG also control leaf folder. Use above insecticides alternately.

**Rice hispa and Leaf folder :** These pests also damages basmati rice in the State. For their

control, follow recommendations mentioned at page 11 against these pests.

## **2. Diseases :**

**Blast** (*Pyricularia grisea*) is relatively more important in Basmati varieties. This fungus causes spindle shaped spots with greyish centre and brown margin on the leaves at maximum tillering stage. It also causes black lesions at the neck of panicle leading to its dropping. For control of this disease, spray Indofil Z-78, 75 WP (zineb) @ 500 g or Hinosan (ediphenfos) @ 200 ml per acre in 200 litre of water at maximum tillering and ear emergence stages.

**Foot-root** : This disease is caused by the fungus *Fusarium moniliforme* and it is both seed and soil borne. The infected seedlings turn pale yellow and become elongated. Later on these seedlings start drying from bottom and these usually die. The symptoms also appear after transplanting

In the field and the infected plants become taller than the normal plants and are killed after few days.

Adventitious roots also appear on the lower nodes. Pinkish growth of the fungus appear on the lower sheaths.

Use disease free seed:

Dip the seed in Bavistin 50 WP @ 0.2% (20 g) + Streptocycline 0.01% (one gram) dissolved in 10 litre of water, for 12 hrs + seedling root dip in Bavistin 50 WP (0.2%) for 6 hrs. before transplanting.

OR

Dip the seed in Bavistin 50 WP @ 0.05% + Streptocycline (0.01%) for 12 hrs and smear the seeds with talc formulation of *T. harzianum* @ 15 g/kg of seed immediately before sowing and seedling root dip for 6 hrs with *T. harzianum* @ 15 g/litre of water before transplanting.

\* Roguing and destruction of infected seedlings in nursery.

\* Spray Tilt 25 EC @ 200 ml in 200 litres of water at boot stage of the crop for production of disease free seed. For the control of various other diseases, insect pests and weeds the control measures are the same as for high yielding varieties.

## **Harvesting and Threshing :**

Basmati/Aromatic rice varieties should be harvested as soon as they mature *i.e.* when the ears are nearly ripe and the straw has turned yellow. Delayed harvesting may cause over-ripening and vshattering of grains. The harvested crop should preferably be threshed on the same or next day of harvesting. The delayed threshing causes high shattering losses, reduced head rice recovery and ultimately reduces the market price of paddy.