

## **SUMMARY OF TECHNICAL DATA EXTRACTED FOR 13 DISTRICTS OF PUNJAB**

The technical information for all the 36 districts has been collected. The technical information is not confined to the district boundaries but it is standardized for regions such as rainfed region, wheat-cotton region, wheat-rice region, central Punjab mixed region, Thal region etc. This information will be classified during next quarter on the basis of regions, however the information applicable to 13 districts have been summarized for major crops as below:

### **Wheat**

**Variety:** Select the proper variety approved by the department of Agriculture, the seed of which could become available. The seed should be pure, healthy and certified. The approved and certified varieties of wheat are Punjab-2011, Millat-2011, AARI-2011, Sehar-2006, Bhakkar-2002, Shafaq-2006, Fareed-2006, FSD-2008, Lasani-2008, Inqlab-91, Wattan-94 and Pasban-90 and Galaxy 2013.

**Sowing Time:** The most suitable sowing time is 10<sup>th</sup> of November but sowing can be done from 1<sup>st</sup> to 20<sup>th</sup> of November.

**Seed rate:** 40 kg/acre. It should be free of any disease and having germination of more than 90%.

**Seed bed preparation:** The field should be well prepared, free of weeds, levelled having optimum moisture for germination. The cotton, sugarcane, rice and maize fields should be rotavated at least once. Disc harrow is preferable for sugarcane fields.

**Fertilizer Use:** First have the soil analysis from the soil and water testing laboratory, then have the recommendation from the website [www.fertilizeruaf.pk](http://www.fertilizeruaf.pk). After having the recommendations, apply the entire amount of P and half N at sowing and rest half N at booting or at the most with second irrigation. All the fertilizer application must be completed by January 31.

**Irrigation:** Wheat requires five irrigations for the best yield, 1<sup>st</sup> at crown root, 2<sup>nd</sup> at stem elongation, 3<sup>rd</sup> at booting, 4<sup>th</sup> at heading and 5<sup>th</sup> at grain filling.

**Weeds eradication:** Weeds must be removed as these may reduce the yield drastically. Weeds eradication could be through hoeing, use of harrow or use of herbicide with proper method of application at proper time.

## Cotton (Non BT)

### **Production Technology for Cotton (Non BT):**

**Variety:** Select the proper variety approved by the department of Agriculture, the seed of which could become available. The seed should be pure, healthy and certified. The approved and certified varieties of cotton (Non BT) are CIM-496, CIM-506, CIM-554, CRSM-38, Alsemi-H-151, CIM-573, SLH-317, BH-167, FH-942 and NIAB-852, N-2, FH-901, CIM-534 and NIAB-2008, FDH-228, and Rohi-FDH-170.

**Seed bed preparation:** Fertile loamy soil with enough quantity of organic matter is suitable for cotton production because of better water holding capacity. There should be no hard pan in the lower layers of soil because it interrupts the growth of the roots. Deep ploughing helps to break the hard pan. Level the soil properly after deep ploughing. Rotavator/disc harrow helps to bury the remains of previous crop.

**Sowing time:** The suitable time for sowing of cotton starts from 1st of April and ends up to 31st of May. Best time is 15<sup>th</sup> May.

### **Method of sowing:**

**Drill sowing:** Cotton, if to be sown with drill, it should be done in lines having the distance of 2.5 feet from each other. Seed should be sown up to the depth of 2-2.5 inches. After first irrigation, do the earthing up on alternate lines. It is important to improve the irrigation efficiency.

### **Ridge sowing:**

**1- Machine sowing:** For machine sowing, the field should be well leveled. Sowing is done on dry beds. After sowing, apply the irrigation water in such a way that it should remain two inches below the level of seed. Apply the irrigation again after 3-4 days to facilitate the germination.

**2- Hand sowing:** Apply the irrigation in the furrows up to 6 to 7 inches before sowing. After irrigation, sow the seed by hand 1 inch above the water level. Fill the empty spaces to complete the number of plants by resowing in watar condition after the second irrigation.

**Seed rate:** 6-10 kg/acre of seed should be used on ridges and 8-12 kg/acre for drill sowing. Almost 10 % more seed should be in hand for resowing if some problems occurs in germination.

**Use of fertilizer:** First have the soil analysis from the soil and water testing laboratory, then have the recommendation from the website [www.fertilizeruaf.pk](http://www.fertilizeruaf.pk). After having the recommendations apply the entire quantity of phosphorus, potassium and if required, zinc and boron, at the time of sowing. Apply entire phosphorus and potassium and 1/3 of nitrogen fertilizer at the sowing time, then 1/3 of remaining nitrogen fertilizer at 1<sup>st</sup> irrigation. Further

remaining nitrogen fertilizer will be applied at time of 2<sup>nd</sup> irrigation. Nitrogen fertilizer must be applied up to 15 August.

**Irrigation:** In the case of line sowing, 1st irrigation should be applied after 40-50 days of sowing and remaining after the interval of 12-15 days, last irrigation must be applied up to 30 September. While in the case of bed sowing, irrigate the field 3-4 days after sowing followed by second irrigation after 7-10 days and last irrigation must be applied up to 15 October.

**Eradication of weeds:** Eradication of weeds should be ensured as early as possible. Effective eradication could be done through hoeing and use of herbicides. Hoeing not only eradicate the weeds but also improves the aeration and moisture content of the soil.

**Use of insecticide:** There should be proper pest scouting. In case of any pest or disease attack, proper spray should be used. This is very much critical especially for cotton.

## **Cotton (BT)**

### **Production Technology for Cotton (BT):**

**Variety:** Select the proper variety approved by the department of Agriculture, the seed of which could become available. The seed should be pure, healthy and certified. The approved and certified varieties of cotton (BT) are FH-113, FH-114, Aliakbar-BT-121, Aliakbar-BT-802 and BT-703, IR-NIBGE-3, Tarzan-1, MNH-886, MNH-456, MH-786, NS-141, Neelam-121, IR-1524, GN-hybrid-2085, Sitara-008, IR-3701, MG-6, Sitara-009, and A-One.

**Seed bed preparation:** Fertile loamy soil with enough quantity of organic matter is suitable for cotton production because of better water holding capacity. There should be no hard pan in the lower layers of soil because it interrupts the growth of the roots. Deep ploughing helps to break the hard pan. Level the soil properly after deep ploughing. Rotavator/disc harrow helps to bury the remains of previous crop.

**Sowing time:** The suitable time for sowing of cotton starts from 1st of March and ends up to 15th of May. Best time is 15<sup>th</sup> March

### **Method of sowing:**

**Drill sowing:** Cotton, if to be sown with drill, it should be done in lines having the distance of 2.5 feet from each other. Seed should be sown up to the depth of 2-2.5 inches. After first irrigation, do the earthing up on alternate lines. It is important to improve the irrigation efficiency

## **Ridge sowing:**

**1- Machine sowing:** For machine sowing, the field should be well leveled. Sowing is done on dry beds. After sowing, apply the irrigation water in such a way that it should remain two inches below the level of seed. Apply the irrigation again after 3-4 days to facilitate the germination.

**2- Hand sowing:** Apply the irrigation in the furrows up to 6 to 7 inches before sowing. After irrigation, sow the seed by hand 1 inch above the water level. Fill the empty spaces to complete the number of plants by resowing in watter condition after the second irrigation.

**Seed rate:** 6-8 kg/acre of seed should be used on ridges and 8-12 kg/acre for drill sowing. Almost 10 % more seed should be in hand for resowing if some problems occurs in germination.

**Use of fertilizer:** First have the soil analysis from the soil and water testing laboratory, then have the recommendation from the website [www.fertilizeruaf.pk](http://www.fertilizeruaf.pk). After having the recommendations apply the entire quantity of phosphorus, potassium and if required, zinc and boron, at the time of sowing. For early sown crop, apply 1/6th of nitrogen at sowing time, 1/6th after 30-35 days of sowing while subsequent doses of nitrogen should be applied after alternate irrigation. For the crop sown in May, apply 1/4th of N at sowing, 1/4th after 30-35 days of sowing, 1/4th at flower initiation and 1/4th at fruiting stage.

**Irrigation:** In the case of line sowing, 1st irrigation should be applied after 30-35 days of sowing and remaining after the interval of 12-15 days while in the case of bed sowing, irrigate the field 3-4 days after sowing followed by second irrigation after 6-9 days and the subsequent irrigations with the interval of 15 days.

**Eradication of weeds:** Eradication of weeds should be ensured as early as possible. Effective eradication could be done through hoeing and use of herbicides. Hoeing not only eradicate the weeds but also improves the aeration and moisture content of the soil.

**Use of insecticide:** There should be proper pest scouting. In case of any pest or disease attack, proper spray should be used. This is very much critical especially for cotton.

## **Rice**

**Variety:** Select the proper variety approved by the department of Agriculture, the seed of which could become available. The seed should be pure, healthy and certified. The approved and certified varieties of rice are Basmati-515, Superbasmati, Basmati-385, Basmati-370, Basmati-2000, Basmati pak, IRRI-6, NIAB IRRI-9, KS-282, KSK-133, Shaheen Basmati, Basmati-198, KSK-432, KSK-431 and KSK-427. The seed should be pure, healthy and certified.

**Time for Nursery Raising:** The nursery should not be raised before May 20. The most suitable time for nursery raising for different varieties is as follows:

Fine varieties: May 20-June 20 and for Shaheen Basmati: June 15- June 30

Coarse varieties: June 01- June 20

Methods for Nursery Raising: there are generally three methods which are being adopted.

- a) **Wet Method:** This method is used where irrigation water is sufficiently available. In this method after plowing land should be filled with water before raising nursery.
- b) **Dry Method:** It is adopted where availability of irrigation water is not sufficient and where water holding capacity of land is low. In this method land is irrigated to bring only watar condition, and then after plowing land dry seeds are sown for raising nursery.
- c) **Rab Method:** It is adopted in those areas where land is so hard. In this method land is leveled, FYM is applied and then let it burn by fire. When ashes turn cold, mix it up in soil and then sow seed in soil with minute irrigation of water.

**Time for Nursery Transplanting:** The nursery must be of 25-40 days before transplanting. The most suitable time for nursery transplanting for different varieties is as follows:

Fine Rice: Best date of transplanting is 14<sup>th</sup> July.

Coarse Rice: Best date of transplanting is 18 June.

**Seed rate:** The recommended seed rates for nursery raising by different methods are given below.

- a) **Wet method:** 4.5-5 kg/acre for fine varieties and 6-7 kg/acre for coarse varieties.
- b) **Dry method:** 6-7 kg/acre for fine varieties and 8-10 for coarse varieties.
- c) **Rab method:** 10-12 kg/acre for fine varieties and 10-15 kg/acre for coarse varieties.

Seed should be free from any disease and having germination of more than 90%.

**Seed bed preparation:** The field should be well prepared, free of weeds, levelled and puddled. In wet method nursery is transplanted with a 9 inch plant to plant distance in one and half inch standing water.

**Fertilizer Use:** First have the soil analysis from the soil and water testing laboratory, then have the recommendation from the website [www.fertilizeruaf.pk](http://www.fertilizeruaf.pk). After having the recommendations, apply the entire amount of Phosphorus, 1/3 of Nitrogen and 1/2 of Potassium at time of sowing and remaining Nitrogen and Potassium fertilizers will be applied in 25 to 50 days by 2 splits just after transplantation of nursery.

**Irrigation:** The rice crop needs submerged condition for optimum growth. It requires about 15-18 extensive irrigations. To keep 2-3 inches of water for first 40 days leads rice crop to generate large number of tillers. The irrigation should be stopped 15 days before harvesting to facilitate harvesting.

**Weeds eradication:** Weeds must be removed within one month after transplanting as these may reduce the yield drastically. If enough water is available, maintain water level upto 1.5 inch for 30 days, for the eradication of weeds. Weeds eradication through herbicides should be done within 3-5 days after nursery transplanting and do not let the water to be dried for a week. The use of proper method at proper time is fruitful.

## Sugar cane

**Variety:** Select the proper variety approved by the department of Agriculture, the seed of which could become available. The seed should be pure, healthy and certified. The approved and certified varieties are SPF-245, SPF-234, SPF-213, CPF-246 and CPF-247. The early varieties CPF-243, HSF-240, HSF-242, CP 77-400, CP43-33 and CPF-237. The late variety is COJ-84.

**Seed bed preparation:** Normally well drained, heavy soils are more suitable for sugarcane production. Bury the rice/cotton stubbles in to the soil with disc harrow/rotavator. Then plough the soil at least for 2 times with chisel plough and once with disc plough. It's better to use subsoiler at least once in 3 years.

**Sowing time:** The most suitable time for September sown crop is the month of September and for spring crop, it starts in the 1st week of February and lasts up to mid of March.

**Method of sowing:** Prepare the land with deep ploughing, level it and then do the planking. Make 10-12 inches deep ridges at the distance of 4 feet with ridger. Apply the Phosphorus and potassium fertilizer and then do the sowing of sugarcane sets in 2 lines with the distance of 6 inches in such a way that ends of sets join with each other. Cover the sets with a light layer of soil with great care. Do not do the planking rather, do it manually. Irrigate as and when required but care should be taken to avoid drying the soil till germination.

**Seed rate:** Normally the seed rate used for 1 acre is 100-120 mounds which will produce 12-15 thousand sets with 4 buds or 17-20 thousand sets with 3 buds.

**Use of fertilizer:** First have the soil analysis from the soil and water testing laboratory, then have the recommendation from the website [www.fertilizeruaf.pk](http://www.fertilizeruaf.pk). After having the recommendations, apply the entire amount of phosphorus and potassium and 1/3rd of nitrogen in ridges. Mix the fertilizer before sowing of crop. Apply rest of nitrogen in 2 installments i.e. in April and June. Use 3-4 trolis per acre of FYM per acre that fulfills the deficiency of organic matter.

**Irrigation:** The consumptive use of water for September sown and spring sown crops is 64 inches and 80 inches respectively. Apply the water as and when required in 16-20 irrigations.

**Eradication of weeds:** Eradication of weeds is very important because it may decrease the yield up to 25%. Eradication could be done by hoeing, crop rotation or by use of herbicides.

## **Maize O.P.V**

**Variety:** Select the proper variety approved by the department of Agriculture, the seed of which could become available. The seed should be pure, healthy and certified. The approved and certified varieties are Agathi 2002, Sahiwal 2002, Golden and Sargodha 2002.

**Sowing Time:** The most suitable sowing time for seasonal maize in plain areas is from July 15 to August 20 and for hilly areas is from March 15 to April 15, while for the spring sowing the suitable time for plain areas is from Jan 15 to end February and for hilly areas it is from end February to March 20.

**Sowing Method:** The synthetic (O.P.V.) varieties should be sown with single row cotton drill at a distance of 2.25 to 2.5 foot. The distance for tractor drawn drill must be 2.5 foot. Remove the weak and diseased plants when plant height is 4-6 inches. After maintaining the Plant to plant distance for late maturing varieties 8-9 inches and for early maturing varieties 7-8 inches, remove all other plants.

**Seed rate:** 12-15 kg/acre for drill sowing and 8-10 kg/acre for ridge sowing. Seed rate depends upon germination rate, seed weight and sowing method. It should be free of any disease and having germination of more than 90%.

**Seed bed preparation:** The field should be well prepared and levelled. The chisel plow must be used 40-45 days before sowing. Cultivator and planker must be used 3-4 times.

**Fertilizer Use:** First have the soil analysis from the soil and water testing laboratory, then have the recommendation from the website [www.fertilizeruaf.pk](http://www.fertilizeruaf.pk). After having the recommendations,, apply the entire amount of P and one-fifth of N at sowing and rest of N at plant height of 1-1.5 foot, at 2.5-3 foot and before flower initiation.

**Irrigation:** The maize should be irrigated 9-10 times. First irrigation should be done within 3-4 days after germination. Afterwards it must be irrigated according to need and condition of the crop. Flower initiation and grain filling stages are critical.

**Weeds eradication:** Weeds must be removed as these may reduce the yield drastically. Weeds eradication could be through hoeing, use of harrow or use of herbicide with proper method of application at proper time.

## **Maize Hybrid**

**Variety:** Select the most suitable recommended variety of seasonal or spring maize from the list issued by the Department of Agriculture. The seed must be healthy and certified. The approved and certified varieties are DK-6142, DK-6339, 32-F-10, DK-6525, FH-421, 30-Y-87 Pioneer, NT-6621, NK-8441, DK-922, ICI-993, FH-810, ICI-984 and 32-B-33.

**Sowing Time:** The most suitable sowing time for seasonal maize in plain areas is from July 15 to August 20 and for hilly areas is from March 15 to April 15, while for the spring sowing the suitable time for plain areas is from Jan 15 to end February and for hilly areas it is from end February to March 20.

**Sowing Method:** The hybrid varieties should be sown with single row cotton drill at a distance of 2.25 to 2.5 foot. The distance for tractor drawn drill must be 2.5 foot. Remove the weak and diseased plants when plant height is 4-6 inches. After maintaining the Plant to plant distance for late maturing varieties 8-9 inches and for early maturing varieties 7-8 inches, remove all other plants. Maximum yield can be obtained by applying bed sowing with single row method.

**Seed rate:** 12-15 kg/acre for drill sowing and 8-10 kg/acre for ridge sowing. Seed rate depends upon germination rate, seed weight and sowing method. It should be free of any disease and having germination of more than 90%.

**Seed bed preparation:** The field should be well prepared and levelled. The chisel plow must be used 40-45 days before sowing. Cultivator and plunger must be used 3-4 times.

**Fertilizer Use:** First have the soil analysis from the soil and water testing laboratory, then have the recommendation from the website [www.fertilizeruaf.pk](http://www.fertilizeruaf.pk). After having the recommendations, apply the entire amount of P and one-fifth of N be applied at sowing and rest of N at plant height of 1-1.5 foot, at 2.5-3 foot and before flower initiation.

**Irrigation:** The maize should be irrigated 10-9 times. First irrigation should be done within 3-4 days after germination. Afterwards it must be irrigated according to need and condition of the crop. Flower initiation and grain filling stages are critical. Ten and nine irrigations at different stages can give significant high grain yield.

**Weeds eradication:** Weeds must be removed as these may reduce the yield drastically. Weeds eradication could be through hoeing, use of harrow or use of herbicide with proper method of application at proper time.