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Growing late spring sugarcane after wheat crop a beneficial crop in north India

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Introduction

Sugarcane is the major commercial crop of India. Sugarcane mainly is grown in October-November (autumn) and February-March (spring) but in some parts of north India, most of the sugarcane is planted in late spring season after harvesting of wheat. Late spring-planted crop of sugarcane produces lesser yield than the crop planted in autumn due to the fact that it gets a shorter time for the growth, besides germination remains less particularly when the cane is planted late. However, better returns from late spring sugarcane can be expected if due consideration is done in the selection of improved varieties, field preparation, seed selection, method of planting, manures and fertilizers, weed control, etc. particularly under late planting conditions.

Keywords: Sugarcane, late spring, varieties, planting method

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Sugarcane is the major commercial and cash crop of the country and occupies about 5.43 m ha area in 18-19, which is about 8 percent higher than 2017-18. India stands first in terms of sugarcane acreage in the world. Total sugarcane production in the country is about 322.5 million tones 2017-18. In the country, sugarcane occupies about 3% of the total cultivated area and contributes about 7.5% of the gross value of agricultural production. Sugarcane supports gur (jaggery) and Khansari (sugar) industries, which together produce about 6.1 million tons of sweetness, consuming about 20% of the cane produced in the country. Uttar Pradesh is the highest producing state in the country that is estimated to have higher sugarcane area 2.3 million hectares in 2017-18. Uttar Pradesh has the largest share both in terms of sugarcane area (45.6 %) and cane production (37.3 %). In general, productivity in southern states is about 1.5 to 2 times than it is in northern states due to favourable climate.

Sugarcane is a tropical plant, but it can be grown in subtropics too. In north India where temperature fluctuations are high, temperature above 50 ^{0}C arrest its growth, those below 15 ^{0}C slow it down. Low temperature and humidity reduce the tillering. An optimum temperature of 30 ^{0}C is best suited for the growth of sugarcane. Sugarcane can be grown on soils ranging from sandy loam to clay loam. It, however, thrives best in well-drained loamy soils. It can also be raised successfully on lighter soils with adequate irrigation facilities and on heavy soils with proper drainage. Saline, alkali and acidic soils are not suitable for this crop.

During the growth period, sugarcane requires high temperature, moist atmosphere and high rainfall for the long period. While at ripening sugarcane requires cool, dry and frost-free weather with bright sunshine. In northern India, most of the sugarcane is grown as of a late spring crop. Most of the time planting spring sugarcane is delayed due to delayed harvesting of wheat crops. Spring sugarcane produces lesser yield than autumn crop as the spring crop gets a shorter time for the growth.

Selection of varieties

Selection of variety is very crucial for getting a good yield of sugarcane. It depends on particular conditions of the farmer and that area. During the recent years a number of high yielding sugarcane

varieties have been developed in different states. Some of the major sugarcane varieties for the northern states are as follows.

Early ripening varieties

Co 0238 (Karan 4): It is an early ripening, high yielding and high sugar content variety, derived from the cross Co LK 8102 x Co 775. This variety was developed at the Sugarcane Breeding Institute, Regional Centre, Karnal and released by the Central Sub-committee on Crop Standards, Notification and Release of Varieties during 2009 as an early maturing variety for commercial cultivation in North-West Zone (NWZ) comprising the states of Haryana, Punjab, Western and Central Uttar Pradesh, Uttarakhand and Rajasthan.

Co 0118 (Karan 2): It is drought tolerant and tolerant to water lodging conditions. It had medium thick, green-yellow canes with obconical internodes, rectangular buds, lanceolate auricle on both sides (generally long on one side), shallow bud groove and weak spines on leaf sheath. The clone is free from splits, pith. Bud cushion is absent. The fibre % is about 12.78 %. The jaggery is of A1 quality with light yellow colour. This clone is moderately resistant (MR) to the prevalent races of red rot.

CoS 8436: This variety has good tillering ability and doesn't lodge. It's resistant to wilt. Canes are hard and short. Yield potential is 65.0-78.0 tons/ha. Sucrose content ranges between 16.5 and 19.5%.

CoS 88230: This variety is usually known as rasgulla among the farmers. The canes are very soft and sweet and are susceptible to stem and shoot borers. Sucrose content varies between 17.5 and 19.5%. Yield potential is 71.0-75.0 tons/ha.

CoS 96268: It produces good ratoon and doesn't lodge. Sucrose content vary between16.7-17.8. Yield potential is 80-90 tons/ ha.

CoP 94211: It's an early maturing variety and moderately resistant to red rot disease. It's very suitable for the North West plains of the country wherever sugarcane is usually planted after the harvest of wheat. Sugar content is about 18. Productivity is higher than the other early maturing varieties like 'CoP 84211', 'CoS 687' and 'CoJ 64'.

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Mid-late ripening varieties

CoS 767: This variety is very popular among the farmers. This can be grown successfully in the problematic areas like drought, frost, soil salinity and soil acidity. It doesn't lodge and produces good ratoon. Sucrose content ranges between sixteen and eighteen. Yield potential is 77.0-88.0 tons/ha.

CoP 90223: its good germination ability with heavy canes, non-lodging habit and produces wonderful ratoon. This variety is resistant to water lodging, frost and red rot. Sucrose content ranges between sixteen and eighteen. Its yield potential is 75.0-90.0 tons/ha.

CoP 84212: Canes are erect, medium-thick, solid and soft. This variety is resistant to lodging and moderately resistant to red rot, smut and wilt. This variety produces good ratoon and sucrose content varies between 16 and 19. Yield potential is 65.0-80.0 tons/ha.

CoP 97222: it's a mid-late variety developed from 'CoP 84212' through open pollination. It produces good ratoon. It's moderately resistant to red rot. The production potential of this variety is more than that of 'CoS 767' and sucrose content ranges between eighteen and nineteen.

CoP 99214: Canes are erect, heavy, hard and light-weight reddish in color. It produces good ratoon. It's resistant to lodging and moderately resistant to red rot and sucrose content ranges between seventeen and nineteen. Its yield potential is 85.95 tons/ha.

CoP 96219: it's recommended for cultivation in North West Zone of the country. It's moderately susceptible to red rot disease. Its yield potential is more than that of 'Co 1148' and 'CoS 767' and sucrose content is about eighteen

Field preparation

Sugarcane crop stands in field for more than a year, it is necessary to give deep ploughing by mould board plough drawn by tractor or bulk. The suitable time for ploughing is just after the preceding crop is harvested or just after a good shower of rain received. The soil is then exposed to atmosphere for a month. The harrowing is done 3 to 4 times to break clods and to make the good tilth and even

to facilitate uniform irrigation. Four to five ploughings to produce good tilth is recommended followed by planking. Field should be prepared after giving a pre planting irrigation, so that at the time of planting there should be sufficient moisture in the field for sowing of sugarcane.

Seed selection

Seed should be from a right variety, from a field free from insect- pests and diseases especially red rot, wilt, smut, etc. and only top one-third to half portion of the cane should be used as seed, as this portion remains immature and has less concentration of sucrose and hence gives better germination. Seed cane should be taken from straight and disease-free crop of not more than twelve months of age. Ratoon crop is not good for seed purpose as ratoon cane may carry the diseases and pests of the previous crop. It would be better to raise the cane for seed purpose independently protection strict vigil on pests and diseases.

Seed preparation and treatment

We all know in north India sugarcane is vegetative propagated, it is more prone to attack by insect-pests and diseases resulting in poor germination. It has been observed that even under satisfactory condition hardly 40-45 percent buds germinate so improvement in germination can improve growth and yields. Maximum care should be there to avoid the damage to the bud during the removal of dry leaves from the cane stalks. The seed cane is cut into two-three budded setts. In one-hectare area about 7.5 tons or 35000-4000 sets of seed cane is required. cane setts should be dipped into 0.5% solution of Agallol (3%) or 0.25% solution of Aretan (6%) for at least half an hour before sowing.

Time of planting

For the spring crop of sugarcane best time for planting is the month of February and March but wheat harvest in after 15 April in north India so sowing time are delayed due to wheat cultivation. In north India mostly farmers take sugarcane after wheat harvesting. Sugarcane requires about 25-32°C temperature for good germination. Sugarcane crop reduces the germination from after sown after wheat, due to which the effect on sugarcane yield.

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Methods of planting

In north India sugarcane is mainly planted by two methods either by flat method or by furrow method of planting.

Flat method of planting

In north India sugarcane is mainly planted by flat method. In this method 8-10 cm deep furrow are opened with a local plough cultivator and sets are planted in them end to end. After planting, furrows are covered with soil and field is levelled with the help of planker. Normally the row-to-row distance should be between 75 and 90 cm.

Furrow method of planting

This method is mainly practiced in parts of Uttar Pradesh, Haryana, Panjab, Uttrakhand and other near areas. Here furrows of 10-15 cm depth are made with the help of sugarcane ridge, sets are planted end to end in these furrows and after planting these furrows are filled with soil with the help of planker. In some areas where there is problem of insect-pests such as termites, white grub, early shoot borer, etc. it would be better to sprinkle the chlorpyriphos mixed in water (at the rate of 3-4 ml/litre of water) over the seed setts after the planting but before covering the setts with the soil. In late spring planting of sugarcane germination can be improved by planting at optimum moisture condition.

Fig.2: Sowing of trench method

Trench method

Trench method presently famous in all north India. In this method furrows are not made, but in place of these only trench 25 cm deep at 90-200 cm distance in line are made by manual labour or trench furrow maker. Fertilizers, and insecticides are mixed with soil and some portion of trenches are again filled with soil, keeping one set/trench at the depth of 8-10 cm and irrigation is applied only on successful sprouting.

Manures and fertilizers

Sugarcane is a heavy feeder crop, therefore for getting the higher yields it should be well manured. About half of the total nitrogen requirement should be met through the bulky organic manures. If these bulky organic manures are available adequately, these should be applied at least 15-20 tons/ acre. Chemical fertilizers should be applied on the soil test basis. However, where soil testing is not possible in one-hectare area 120-150 kg nitrogen, 80 kg phosphorus and 60 kg potassium should be applied. In northern India, in spring planted crop half of the nitrogen and full phosphorus and potassium should be applied at the time of planting and rest of the nitrogen within the 80-90 days after planting. Top dressing of nitrogen should be done in 2-3 splits, with irrigation. Nitrogen should be applied very cautiously as in lower amount it limits the cane yield, while in higher amount it deteriorates the cane quality by decreasing the sucrose content. Besides, excess nitrogen results in lodging of cane and delayed maturity of cane.

Weed control

Spring sugarcane takes about four to five weeks to germinate. During this period, weeds start emerging and continue to emerge till the onset of monsoon. Before the onset of monsoon generally broad leaf annuals of winter season and some perennials emerge. Weeds which emerge during rainy season are mostly annual grasses. Mechanical weed control measures can be practiced during the pre- monsoon period only, but during the monsoon period mechanical control of weeds is not possible and ineffective. For controlling the weeds mechanically one blind hoeing is done before the germination of sugarcane at about one month after sowing. One irrigation should be provided before this blind hoeing so that weeds can germinate and emerge. After emergence of the crop

three to four manual weedings may be sufficient to keep early sugarcane crop free from weed competition during the first 3-4 months after planting.

Now many herbicides are available to control the weeds in sugarcane crop. Vernolate @ 3-4 kg/ha mixed in sufficient water should be sprayed and mixed well into the soil before planting of the crop to control most of the annual grasses and sedges effectively for 4-6 weeks after planting of the crop. Many pre- emergence herbicides are applied after the planting but before the emergence of the crop of sugarcane. These herbicides that control the weeds for 4-6 weeks, viz Alachlor and Atrazine @ 1-2 kg a.i./ha, can be sprayed after the planting of sugarcane but there should be sufficient moisture in the field at the time of their application for better efficacy. Some post emergence herbicides are also available which could be sprayed even after the emergence of the crop like directed spray of 2,4-D @ 0.5 kg active ingredient/ha controls most of the broad leaf weeds. It also controls Striga spp. a parasitic weed in sugarcane. Glyphosate and Paraquat @ 0.25-0.50 kg/ha can be directly sprayed on the weeds mixed in water, but utmost care should be taken as these are non-selective. Besides, at the time of spray the sugarcane plants should have grown up enough to tolerate these herbicides, it is likely when crop is about three months old. The Glyphosate or Paraquat should be applied with the help of the hood attached with the nozzle to avoid the damage to the crop.

Summary

In spring sugarcane better yield and returns can be expected by selecting suitable varieties, which have the capacity for better germination and tillering. Planting of pre-sprouted setts enhances the germination of spring crop of sugarcane. Higher seed rate for planting, deeper planting depth and one pre-planting irrigation would result in better plant stand and productivity of spring sugarcane.