Studies on the Different Planting Dates and Forms of Sulphur on Growth, Yield and Quality of Onion

THESIS

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SUMMARY AND CONCLUSION

Chapter VI

The results obtained from the present investigation entitled **"Studies on the Different Planting Dates and Forms of Sulphur on Growth, Yield and Quality of Onion"**wasundertaken on the Horticulture Research Farm-I of Department of Applied Plant Science, BabasahebBhimraoAmbedkar University, Lucknow.The salient findings emanating from the present investigation are summarized below:

- The highest plant height at 30, 60 and 90 days (34.84 cm, 54.68 cm and 75.72 cm in the year 2012-13 and 35.17 cm, 55.88 cm and 76.12 cm in the year 2013-14), respectively after planting was recorded in early planting date P_1(15th November) withelemental sulphurS_2(40 kg/ha)and there was a gradual decrease in plant height as the planting delayed whilelowest plant height (20.29 cm and 56.24 cm in the year 2012-13 and 21.29 cm, 45.79 cm and 56.24 cm in 2013-14) was recorded in late plantingP_3 (15th January) with no application of elemental sulphur or gypsum in both the consecutive years.
- Maximum number of leaves(4.63, 8.53 and 11.70 in 2012-13 and 4.60, 8.43 and 11.53 in 2013-14) at 30, 60 and 90 days, respectively after planting was counted in early planting P_1(15th November) withelemental sulphur S_2(40 kg/ha) and counting decreases linearly with the planting time and minimum number of leaves (2.53, 4.00 and 6.10 in 2012-13 and 3.00, 4.23 and 6.20 in 2013-14) were counted in late planting P_3 (15th January)without application of elemental sulphur or gypsumduring both the years.
- The maximum neck thickness (1.05 cm, 1.96 cm and 2.63 cm in 2012-13 and 1.11 cm, 2.00 cm and 2.70 cm in 2013-14) was measured in early planting P_1(15th November)with elemental sulphur S_2(40 kg/ha) at 30, 60 and 90 days, respectively after transplanting and decrease in neck thickness was recorded in late plantingP_3 (15th January) with no sulphur application in both the year.
- Maximum bulb weight(83.22 g and 87.55 g) after harvesting was weighed in early planted seedlings with the application of elemental sulphurP_1S_2(15th November + 40 kg/ha) in 2012-13 and 2013-14, respectively and slight decrease in bulb weight was recorded in P_2 (15th December) planting while minimum bulb weight (46.37g and 49.03g) was weighed in late planting $P_3S_oG_0$(15th January + no sulphur fertilization) in both the year, respectively.

- Maximum bulb length(6.39cm and 6.79cm) was measured in early planting with the application of elemental sulphurP_1S_2(15^{th} November + 40 kg/ha) while the minimum bulb length (4.14cm and 4.37cm) was measured in late planting$P_3S_oG_0$ (15^{th} January + no sulphur application) during both the consecutive years, respectively.
- Maximum bulb diameter(7.15 cm and 7.59 cm) was also measured in early planting with the application of elemental sulphurP_1S_2(15^{th} November + 40 kg/ha) whereas the minimum bulb diameter (4.51 cm and 4.61 cm) was measured in delayed planting $P_3S_oG_0$ (15^{th} January with no sulphurfertilization) in the year 2012-13 and 2013-14, respectively.
- The maximum bulb size (44.84 cm^2 and 49.05 cm^2) after harvesting was recorded in P_1S_2 (15^{th} November + 40 kg/ha)and bulb size gradually decreased as planting delayed in both the years. Minimum bulb size (20.37 cm^2 and 19.79 cm^2) was recorded in $P_3S_0G_0$ (15^{th} January with no sulphur fertilization) during the year 2012-13 and 2013-14, respectively.
- Bolting percentage was minimum or negligible (0.28% and 0.04%) in late planting P_3(15^{th} January) whereas bolting percentage was computed highest (6.19% and 6.28%) in early planting P_1(15^{th} November) followed by P_2 (15^{th} December) planting(5.00% and 4.90%) in both the years, respectively.
- Maximumyield per plot (5.84 kg and 5.67 kg) and total yield per hectare (38.94 t and 37.83 t) were recorded in early planting with the application of elemental sulphurP_1S_2 (15^{th} November + 40 kg/ha) and yield decreases gradually with the delay in planting time. Minimum yield per plot (3.47 kg and 3.59 kg) and per hectare (23.17 t and 23.97 t) were recorded in late planting $P_3S_0G_0$ (15^{th} January with no sulphur fertilization) during both the consecutive years, respectively.
- Highest marketable yield (36.49 tons and 35.82 tons) was found in treatment combination P_1S_2 (15^{th} November +40 kg/ha) while minimum marketable yield (23.02 tons and 23.89 tons) was observed in later planting$P_3S_0G_0$ (15^{th} January with no sulphur fertilization) during 2012-13 and 2013-14, respectively.
- The highest benefit cost ratio (3.48 and 3.43) was observed in early planted seedlings treated with elemental sulphur P_1S_2 (15^{th} November + 40 kg/ha) whereas minimum benefit cost ratio (1.58 and 1.65) was found in $P_3S_0G_0$ (15^{th} January with no sulphur fertilization) during both the consecutive years 2012-13 and 2013-14, respectively.

- Early transplanting with elemental sulphurP_1S_3 (15^{th} November + 60 kg/ha) resulted in higher total soluble solids content (15.97 and 16.87 ^{0}Brix) in the bulb and decreases linearlywith delay in planting time. Lowest total soluble solids content (10.36 and 10.73 ^{0}Brix) were observed in late planting $P_3S_0G_0$ (15^{th} January with no sulphur fertilization) during the year 2012-13 and 2013-14, respectively.
- Highest content of ascorbic acid(13.39 and 14.02 mg/100g) was estimated in P_1S_2 (15^{th} November + 40 kg/ha) and lowest ascorbic acid content (6.65 and 7.32 mg/100g) in last planting date $P_3S_0G_0$ (15^{th} January with no sulphur fertilization) in both the years, respectively.
- Minimum pyruvic acid content (3.71 and 3.11 µm/g) was found in early planting $P_1S_0G_0$ (15^{th} November with no sulphur application) whereas maximum pyruvic acid (8.11 and 7.97µm/g) was found in late plantingwith elemental sulphur P_3S_3 (15^{th} January + 60 kg/ha) during the year 2012-13 and 2013-14, respectively.
- Maximum reducing sugar (5.81 and 5.74%) and total sugars(12.64 and 12.52%) were observed in early plantingand elemental sulphur P_1S_1 (15^{th} November + 20 kg/ha) whereas minimum values for reducing sugar (2.03 and 2.21%) and total sugars (8.35 and 8.48%) were noted in late planting$P_3S_0G_0$ (15^{th} January with no sulphur fertilization) during the year 2012-13 and 2013-14, respectively.
- Highest content of non reducing sugar (7.24 and 7.30%) was recorded in P_2S_1 (15^{th} December + 20 kg/ha) while minimum non reducing sugar content (5.44 and 5.50%) was estimated in early planting$P_1S_0G_0$ (15^{th} November with no sulphur fertilization)during both the years, respectively.

CONCLUSION

The overall results obtained from present investigation clearly revealed that planting time and sulphur fertilization are among the critical factors determining the yield and quality traits of onion. The early planting (15^{th} November) of seedling exposed to longer favourable growth period as compared to later transplanted seedlings before bulb initiation which results in vigorous plants producing larger bulbs. Although, early planting results in more bolted bulb production but the percentage of bolting doesn't differ very much with normal planting time (15^{th} December) as a result early planted seedlings gives the higher total yield and marketable yield compared to December planting. Therefore, optimum planting time according to specific area should be determined to avoid quality problem associated with early or late planting dates.

Another factor which contributes the yield and quality is sulphur fertilization with appropriate dose.Sulphur fertilization mainly affects the quality of bulbs along with yield. Elemental sulphurgives the best result as compared to gypsum mediated sulphur application for each and every parameter. Optimum dose of elemental sulphur40 kg/ha is much more economical to get higher bulb yield and exhibited better quality of bulbs in comparison to rest of the other higher and lower doses of sulphur application. Early planting supplemented with 40 kg/ha elemental sulphur results in higher yield and quality bulb production. Thereby proper nutrient balance and optimum time adjustment seems to be obtain quality bulbs under Lucknow conditions. However, before recommendation to the farmers for commercial cultivation,research trial needs further repetition.

FUTURE LINE OF WORK

- Need to develop a nursery raising technique to get the healthy seedling in the month of September to prevent the nursery seedlings with high temperature, humidity, sun intensity as crop is susceptible to fungal infection.
- Although, there is a high yield in transplanting one month before than normal time period, there is need to access the storability of the bulb because early transplanted bulb has more moisture content which may decrease the shelf life.

- Need to collect, conserve and develop the less bolting type of germplasms.