SUMMARY
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I. Effect of Bulb size, Spacing and Depth of Planting on Growth, Flowering and Bulb Production in Tuberose

This 3^3 factorial experiment with 3 replications was conducted for two years from 1978-1979 in order to study the effect of bulb size, spacing and depth of planting on growth, flowering and bulb production in tuberose. There were 3 bulb sizes (1, 2 and 4 cm diameter), 3 spacings (15 x 15, 20 x 20 and 30 x 30 cm) and 3 depth of plantings (3, 5 and 7 cm). The cultivar 'Single' was used in this experiment. The important findings of this experiment are summarized below.

(i) Bulb size proved to be the most important factor in influencing the growth, flowering and bulb formation in tuberose. Regardless of spacing and depth of planting, the number of leaves increased with the increasing bulb size.

(ii) It has been also noted that the larger the size of bulbs at planting, the earlier was the emergence of flower spikes. The number of flower spikes also increased appreciably as the size of bulbs for planting was increased from 1.0 cm to 4.0 cm. Further, the quality of flower spikes in terms of length of spike, length of rachis, number of florets per spike and longevity of spike improved significantly when larger bulbs were used for planting.

(iii) Apparently, spacing and depth of planting had not much significant effect on vegetative growth of plants. Likewise, flowering was neither hastened nor delayed by these two factors. However, wider spacing (30 cm x 30 cm) increased the number of flower spikes per plant appreciably over closer spacing (15 cm x 15 cm). The number
of florets per spike also tended to increase with increasing spacing, while the length of spike or rachis was not affected by spacing.

(iv) Deeper planting resulted in increased number of spikes; but it showed no appreciable effects on the quality of flower spikes.

(v) Bulb production increased with the increase in size of bulbs used for planting, as well as with increasing spacing, but decreased with the increasing depth of planting.

(vi) A number of significant interaction was noted on flowering of tuberose. In general, higher values were obtained whenever larger sized bulbs were involved. Higher yield of flower spikes was obtained when larger sized (4.0 cm dia.) bulbs were planted at a wider spacing (30 cm x 30 cm), while poorest yield was recorded in 1.0 cm bulbs planted 15 cm x 15 cm apart. In the first year wider spacing and deeper planting gave better yield of spikes, in the second year, wider spacing and shallow depth of planting was found to be more beneficial. Larger sized (4.0 cm and 2 cm dia.) bulbs planted either 30 cm x 30 cm or 20 cm x 20 cm apart at a depth of 7 cm appeared to be the best treatment in terms of yield of spikes.

II. Effect of Different Levels of Nitrogen, Phosphorus and Potassium on Growth, Flowering and Bulb Production in Tuberose

This experiment consisted of 5 levels of N (0, 5, 10, 15 and 20 g per sq.m.), 3 levels of P₂O₅ (0, 20 and 40 g per sq.m.) and 3 levels of K₂O (0, 20 and 40 g per sq. m.). There were 45 treatment combinations, each having 3 replications. The experiment was conducted for 2 successive years from 1975 to 1977 at the Indian
Institute of Horticultural Research, Bangalore on sandy loam soils. The cultivar 'Single' was used. The experimental findings are summarized below.

(i) Amongst the nutrient elements tested here, nitrogen was found to be the most effective in influencing the growth, flowering and bulb production in tuberose. Application of nitrogen significantly promoted the vegetative growth of plants over control.

(ii) The beneficial effect of added nitrogen was reflected in flowering also. Thus, the production of flower spikes increased with application of nitrogen, maximum yield being found under highest dose of nitrogen (20 g/m²). All the flower quality parameters viz. length of spike, length of rachis, weight of individual florets and keeping quality of spikes in plant and in vase showed marked improvement as a result of added nitrogen. Although the number of florets per spike was not affected in the first year, in the following year floret numbers also increased significantly as a consequence of nitrogen fertilization.

(iii) Application of nitrogen did not influence the yield of flowering-size bulbs, but appreciably increased the yield of bulblets.

(iv) Phosphorus levels used in this experiment did not effect the vegetative growth of plants to an appreciable extent. However, it increased the height of plant and the number of leaves produced per plant in the first and second year, respectively. Phosphorus did not increase the spike yield, but improved the quality of spikes. Thus, spike length, number of florets per spike and weight of florets increased as a consequence of phosphorus fertilization at the highest level (40 g/m²).
(v) The application of K\textsubscript{2}O did not affect the growth or flowering of tuberose, except that it improved the length of rachis.

(vi) Neither phosphorus nor potassium showed any significant effect on bulb yield.

(vii) Variation in growth, flowering and bulb yield due to such interactions as N x P, N x K, P x K and N x P x K was not significant, except the interaction of P x K on the number of bulblets per plant. Application of P\textsubscript{2}O\textsubscript{5} and K\textsubscript{2}O at the rate of 20 and 40 g/m\textsuperscript{2}, respectively, resulted in significant increase in the yield of bulblets.

III. Effect of Different Storage Temperatures of Bulbs on Growth, Flowering and Bulb Production in Tuberose

Large size bulbs (3.0 cm diameter) of tuberose (cv. 'Single') were stored at 0, 4, 10 and 30°C for 4, 6 and 8 weeks and then planted in pots to study the effect of storage temperatures on growth, flowering and bulb production. Freshly harvested bulbs of same size were also planted, which served as control. The important findings are summarized below:

(i) All bulbs stored at 0°C for more than 4 weeks rotted.

(ii) Irrespective of duration, low temperature storage of bulbs adversely affected growth and flowering of tuberose. However, storage of bulbs at 10°C showed some improvement in the quality of flower spikes.

(iii) Storage of bulbs at 30°C for 6 or 8 weeks induced considerable earliness in flowering and increased the spike yield, but the quality of the spike deteriorated especially when stored for longer duration (8 weeks).
(iv) Low temperature (4°C) storage adversely affected the yield of flowering-size bulbs. The control bulbs and bulbs stored at room temperature for 6 weeks produced the maximum number of flowering size bulbs.

IV. Effect of Preplanting Treatments of Bulbs with Gibberellic Acid on growth, flowering and Bulb Production in Tuberose

Freshly harvested bulbs (3.0 cm diameter) of tuberose (cv. 'Single') were soaked in 10, 100, 250 and 500 ppm of gibberellic acid for 24 hrs, dried in air and planted in pots. Bulbs soaked in distilled water served as control. Significant results are summarized below.

(i) Gibberellic acid at all the concentrations tested in this experiment delayed the sprouting of bulbs; the delay was more pronounced with higher concentration of GA$_3$.

(ii) Treatments with GA$_3$ did not affect the height of plants but tended to decrease the number of leaves.

(iii) GA$_3$ delayed the emergence of the first flower spike; 500 ppm was found most effective in this regard.

(iv) Flower spike yield tended to decline as a consequence of GA$_3$ treatments, but the quality of spikes in terms of spike length, racnis length, number of florets per spike and longevity of spike showed improvement.

(v) The yield of flowering-size bulbs declined appreciably following treatments of bulbs with GA$_3$. 