6. SUMMARY

Investigations were conducted at Regional Research Station, Dharwar, during 1966 kharif and 1967 summer seasons, to study the effect of moisture regimes with different levels of nitrogen and phosphorus on growth, yield, and quality of groundnut. The irrigations given when the available moisture was depleted to 75, 50 and 25 per cent of available moisture were compared with no irrigation in kharif and irrigation given when soil moisture tension reached 0.4 atm at 22.5 cm soil depth in summer.

The results obtained are summarised below:

1. The moisture regime receiving irrigation at 100-50 per cent available moisture with application of 25 kg nitrogen and 150 kg P$_2$O$_5$ per hectare gave highest pod yield of groundnut in kharif as well in summer.

2. The germination was affected with application of nitrogenous fertilizer. It decreased on an average by 2.96 and 4.83 per cent in kharif and by 2.69 and 4.21 per cent in summer with application of 25 kg and 50 kg nitrogen per hectare, respectively, when compared with no fertilizer treatment.
3. About 75 to 85 per cent of roots by weight occurred in 0.30 cm soil layer and 15 per cent in the next 30-60 cm layer. The total root weight was maximum in 100-50 per cent available moisture regime and was least in 100-75 per cent available moisture regime.

4. The highest dry matter accumulation during all phases of growth of crop was recorded in the treatment receiving irrigation at 100-75 per cent available soil moisture combined with 50 kg nitrogen and 150 kg P2O5 per hectare, followed by 100-50 per cent available moisture regime with the above fertilizer dose. The dry matter accumulation increased with increase in the fertilizer levels in both seasons. Of the total dry matter, 60 per cent was produced by the time the crop attained gynophore stage.

5. The maximum reproductive efficiency was 19.2 in kharif and 21.4 in summer in 100-50 per cent available moisture regime compared to 18.3 and 15.1 in kharif and 18.2 and 15.2 in summer in 100-75 and 100-25 per cent available moisture regime, respectively.

6. The least number of undeveloped pods per plant of 2.11 in kharif and least weight of undeveloped pods of 65.92 g per plot in summer were recorded in the treatment receiving irrigation at 100-50 per cent available moisture.
7. The number of undeveloped pods per plant in kharif and weight of undeveloped pods per plot in summer increased with increase in level of nitrogen and decreased as the level of phosphorus increased within the same level of nitrogen.

8. The highest pod yields of 3219.14 kg and 4060.08 kg per hectare were recorded in kharif and summer, respectively, with 100-50 per cent available moisture regime combined with 25 kg nitrogen and 150 kg P$_2$O$_5$ per hectare. This treatment gave about 10 per cent and 12 per cent higher yield in kharif and 18 per cent and 21 per cent higher yield in summer over 100-75 and 100-25 per cent available moisture regimes, respectively, with the same level of fertilizer.

9. The yield attribute like shelling percentage and 100-kernel weight were maximum in 100-50 per cent available moisture regime combined with 25 kg nitrogen and 150 kg P$_2$O$_5$ per hectare in both the seasons.

10. Highest harvest indices of 60.75 in kharif and 54.50 in summer in the treatment receiving irrigation at 100-50 per cent available moisture with the treatment receiving 25 kg nitrogen and 150 kg P$_2$O$_5$ per hectare were recorded.
11. The lowest harvest indices of 47.50 in kharif and 47.25 in summer were obtained in moisture regimes receiving no irrigation in kharif and receiving irrigation at 100-25 per cent available moisture in summer with 50 kg nitrogen and 50 kg $P_2O_5$ per hectare.

12. The oil content in the kernel increased with increase in phosphorus level with the same level of nitrogen. The highest oil percentage recorded was 55.52 in kharif and 56.25 in summer at 100-50 per cent available moisture regime with 25 kg nitrogen and 150 kg $P_2O_5$ per hectare.

13. The nature of yield response to moisture was quadratic in both seasons. The response was highest in 100-50 per cent available moisture regime in both seasons followed by 100-75 per cent available moisture regime.

14. The nature of yield response to phosphatic fertilization was linear.

15. The nitrogen content in plant associated with higher pod yield was between 3.49 to 3.53 per cent in kharif and 3.23 to 3.31 per cent in summer at flowering stage (0-30 days) and 2.33 to 2.40 per cent in kharif and 2.66 to 2.86 per cent in summer at gynophore stage (30-60 days).
16. The phosphorus content in plant associated with higher pod yield was 0.55 per cent in kharif and 0.56 to 0.57 per cent in summer at flowering phase (0-30 days) and 0.32 to 0.34 per cent in kharif and 0.40 per cent in summer at gynophore stage (30-60 days).

17. Maximum uptake of nitrogen and phosphorus of 70 per cent of the total was in gynophore stage. The uptake was less with 100-75 and 100-25 per cent available moisture regimes as compared to 100-50 per cent available moisture regime.

18. The consumptive use of water by groundnut per hectare ranged from 732.7 to 983.0 mm in kharif and 1551.3 to 1887.6 mm in summer. Under 100-50 per cent available moisture regime it was 956.8 and 1736.6 mm in kharif and summer, respectively. The consumptive water use increased with increase in available moisture. It also increased with the increase in the levels of fertilizers.

19. The mean daily rates of water use by the groundnut crop was lowest at germination, increased during flowering and reached maximum at pod development stage and declined at harvest in both the seasons. The daily consumptive water use was highest in 100-75 per cent available moisture regime.
and lowest in no irrigation regime. In 100-50 per cent available moisture it was 2.33, 5.42, 7.01, 7.54 and 3.53 in kharif and 4.05, 6.77, 8.15, 8.54 and 6.00 in summer in germination, early vegetative, flowering, pod development, and maturity stages, respectively.

20. The maximum water use efficiency was 3.35 in kharif and 2.38 in summer at 100-50 per cent available moisture regime combined with 25 kg nitrogen and 150 kg P₂O₅ application per hectare. The water use efficiency was more in kharif than in summer.

21. The irrigation requirement under optimum moisture regime of 100-50 per cent available moisture was 1024.5 mm in kharif and 1977.5 mm in summer. The irrigation requirement in 100-75 per cent available moisture regime was 2189.4 mm in summer. Saving of 98.5 mm water in kharif and 211.9 mm in summer was observed in case of 100-50 per cent available moisture over that of 100-75 per cent available moisture regime.

22. Of the total moisture depletion, 86.9 and 75.5 per cent were removed by the groundnut crop from 0-30 cm soil layer in 100-50 per cent available moisture regime in kharif and summer, respectively.
23. The pod yield with irrigation at 0.4 atm tension in summer was on par with the yield of 100-50 per cent available moisture regime.

24. Coefficient of correlation between daily consumptive water use with irrigation at 0.4 atm tension and the daily evaporation from sunken screen evaporimeter was highly significant.

25. The maximum cash return per rupee spent on fertilizers was Rs. 9.04 in kharif and Rs. 10.60 in summer when irrigation was given at 100-50 per cent available moisture with 25 kg nitrogen and 150 kg P₂O₅ per hectare. The cash return increased with the increasing level of phosphorus at the same level of nitrogen. The cash return was more in summer as compared to that in kharif.
PRACTICAL APPLICATION OF THE RESULTS

The studies revealed that:

1. The yield of groundnut can be increased to the extent of 45 per cent by application of 25 kg nitrogen and 150 kg $P_2O_5$ per hectare in red sandy loam soils containing 28.0 kg available $P_2O_5$ per hectare.

2. About 25 per cent highest yields of groundnut can be obtained in summer than in kharif under Dharwar agro-climatic conditions.

3. The percentages of nitrogen and phosphorus in groundnut plants at flowering - N 3.23 to 3.53, $P_2O_5$ 0.55 to 0.57, at gynophore - N 2.33 to 2.86, $P_2O_5$ 0.32 to 0.40, have given higher yields. This works out to a ratio of 1:6 of nitrogen and phosphorus. These are the critical levels of nitrogen and phosphorus in groundnut plants to obtain higher yields.

4. Giving irrigation to groundnut at 50 per cent depletion of available moisture tends to give higher pod yield.

5. The soil should be irrigated to wet a depth of 30 cm as most of the effective roots of groundnut are found in that layer.