ROLE OF DIFFERENT COMPONENTS OF PRODUCTION TECHNOLOGY OF GROUNDNUT (*Arachis hypogaea* L.) UNDER POLYTHENE MULCH

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ABSTRACT

India is the largest groundnut growing country in the world and second largest producer of groundnut next to China. About 19% of the total area under groundnut is irrigated. Groundnut is grown in the rabi season in about 1.5 million ha with assured moisture with an average yield of 1.5 to 2.0 t ha⁻¹. Among abiotic stresses, drought, temperature extremes, mineral nutrient deficiencies are most important. It is necessary to identify the factors most likely to affect the yield below a certain upper limit (Yield potential). Favourable modifications of the limited factors by management skills e.g. alleviation of low temperature stress by polythene mulching is one of the way. Use of mulches especially polythene mulch is useful for the temperature stress management. Polythene (PE) film mulching technique was developed in the 1970’s to accelerate initial growth, flowering, and fruit setting and to extend the growing period in Korea. The technique resulted in a “White Revolution” in groundnut production. Keeping above-mentioned points in view, the present study was undertaken to develop agrotechniques under polythene mulch.
Field experiments were conducted during 1999-2000 and 2000-2001. The soils of the experimental plot were lateritic, clay in texture, medium high in organic carbon, low in available nitrogen, and available P₂O₅, high in available K₂O with pH 6.65. The experiment was laid out in Split-split Plot Design with three replications.

The results revealed that the dry pod and kernel yield of groundnut was recorded to the tune of 5.21 and 3.87 t ha⁻¹ under polythene mulch (PMG) and 3.55 and 2.62 t ha⁻¹ under non-mulch (NMG), respectively which was nearly 47% higher over NMG. This was mainly because there was daily 2.58 °C increase in the soil temperature under PMG and total accumulated temperature increased by 325.77 °C during the entire growth period. There was early germination under polythene mulch by two days and initial crop growth was also better.

JL 24 and TG 26 behaved similar with each other in respect of oil content, dry pod, kernel and oil yield, while, JL 24 recorded significantly higher dry haulm yield over TG 26 during both the years. Growth parameters viz. plant height and spread were higher in variety, JL 24 (Phule pragati), whereas the number of branches per hill was more in TG 26. TG 26 recorded significantly higher dry matter weight over JL 24 at 30 DAS, however, JL 24 showed its superiority over TG 26 in respect of dry matter weight there after up to harvest. JL 24 and TG 26 recorded near about same mean weight of pods per hill, shelling percent, 100-pod weight and 100-kernel weight during both the years, while JL 24 produced significantly higher sound mature kernel percentage over TG 26. TG 26 registered significantly higher mean number of mature, as well as immature pods per hill and harvest index over JL 24. JL 24 recorded significantly higher nitrogen content in the pods over TG 26, while, TG 26 showed its superiority in respect of N content in the haulm. Mean phosphorus, potassium and calcium content in groundnut pods and haulm were not influenced significantly due to genotypes. Genotypes did not influence the mean nitrogen, phosphorus, potassium and calcium uptake by the groundnut pods, but JL 24 recorded significantly higher mean nitrogen, phosphorus, potassium and calcium uptake by haulm and total nitrogen uptake over TG 26. JL 24 and TG 26 recorded 1.25 and 1.28 B:C ratio, respectively.

Both the layouts viz. FB and BBF did not differ significantly in case of dry pod, haulm, kernel and oil yield during both the years, however, slightly higher values of
dry pod, kernel and oil yield were observed under BBF, while haulm yield was more in FB. All the crop growth, yield and quality attributes like plant height, plant spread, number of leaves per hill, number of branches per hill, dry matter weight, mean number of mature pods per hill, mean number of immature pods per hill, weight of pods per hill, 100 pod weight, 100-kernel weight and harvest index, shelling percent, sound mature kernel percentage, oil content and protein content, as well as nutrient uptake were of the similar magnitude under flat bed and broad bed furrows, respectively. BBF registered slightly higher values of the mean gross returns, net returns and B:C ratio over FB during both the years.

Application of 50:100:70 kg N, P₂O₅ and Ca /ha (N₃) recorded 16.4 and 16.8 % higher dry pod yield and 19.6 and 20.8 % higher kernel yield over N₁ during 1999-2000 and 2000-2001, respectively, but the difference between N₃ and N₄ was not significant. The treatments N₃ and N₄ also recorded significantly higher oil yield and haulm yield over rest of the treatments. Higher dose of nutrients viz. 75:150:105 kg N, P₂O₅ and Ca /ha (N₄) registered significantly higher plant height and spread, while application of 50:100:70 kg N, P₂O₅ and Ca /ha (N₃) recorded significantly higher number of branches and number of leaves per hill over N₁ and N₂. N₃ and N₄ produced significantly higher dry matter weight over rest of the nutrition treatments at all the crop growth stages. Application of 37.5 : 75 : 35 kg N, P₂O₅ and Ca /ha (N₂) noted significantly higher dry matter over N₁. The values of yield attributing characters viz. mean number of mature pods per hill, mean weight of pods per hill, 100-pod weight, 100-kernel weight and harvest index were considerably higher due to application of 50:100:70 kg N, P₂O₅ and Ca /ha (N₃) and 75:150:105 kg N, P₂O₅ and Ca /ha (N₄) than the other treatments under study.

Maximum values of quality attributes were observed due to application of 75:150:105 kg N, P₂O₅ and Ca /ha (N₄) and 50:100:70 kg N, P₂O₅ and Ca /ha (N₃) compared to N₂ and N₁ while, N₃ and N₄ treatments behaved similarly with each other. Application of 37.5:75:35 kg N, P₂O₅ and Ca/ha (N₂) significantly increased the yield and quality attributes over N₁. Application (N₄) registered significantly higher nitrogen, phosphorus, potassium and calcium content in the pods and haulm over rest of the treatments, except N₃. Application of 50:100:70 kg N, P₂O₅ and Ca /ha (N₃) and
75:150:105 kg N, P₂O₅ and Ca /ha (N₄) also noted significantly higher mean uptake of major plant nutrients by pods, haulm and total uptake over the remaining treatments. Application of 50:100:70 kg N, P₂O₅ and Ca /ha (N₃) recorded the maximum gross returns (Rs. 80024/ha), net returns (Rs. 56609/ha) and benefit cost ratio 3.42.

There was 9.1% and 10.4% increase in dry pod, 10.5% and 8.4% increase in kernel 11% and 9.4% increase in oil yield over control, while there was significant reduction in the dry haulm yield (5.21% and 7.02%) due to application of paclobutrazol over control during 1999-2000 and 2000-2001, respectively. Application of paclobutrazol significantly reduced the plant height, plant spread and number of leaves, but the number of branches per hill was not influenced significantly. This treatment also significantly reduced the number of immature pods per hill and increased the number of mature pods per hill and weight of pods per hill over control. An application of paclobutrazol significantly increased the yield and quality attributes viz. 100-pod weight, 100-kernel weight, harvest index, shelling percent, sound mature kernel percentage, oil content and protein content over control. Mean phosphorus and calcium content in the pods increased significantly over control due to application of paclobutrazol. Mean nitrogen, phosphorus and potassium uptake by pods was increased, while nitrogen, phosphorus and potassium uptake by haulm was decreased due to application of paclobutrazol. Application of paclobutrazol recorded maximum mean gross returns, net returns and B:C ratio which was 7.6, 9.9 and 5.0 per cent higher over control.