

EFFECT OF NITROGEN AND PHOSPHORUS ON ASIRIYA MWITUNDE GROUNDNUT IN KERALA

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Asiriya Mwitunde, a high yielding variety of groundnut from Tanganiyaka was introduced to India in 1963. The trials conducted elsewhere with this variety (Kulkarni, *et al.*, 1967) has shown that this could be successfully grown under Indian condition. In the first part of this paper we had discussed that this variety could very well be cultivated under the agro climatic conditions of this state. In this paper the performance of this variety particularly with reference to nodulation, oil content and protein content as influenced by N and P fertilizers are discussed.

Materials and Methods

The aspect of field experimentation has been discussed earlier. The number and weight of nodules per plant were taken at 30, 60 and 90 days after sowing. The N content of kernels was worked out by Kjeldal's method given by Piper (1942). The oil content was estimated from oven dry samples from each plot by the cold percolation method (Kantha and Sethi, 1957).

Results and Discussion

The data on number and weight of nodules per plant, oil content protein percentage are presented in Table I. It could be seen from the table that increasing levels of N had significantly reduced the number and weight of nodules per plant during the second and third stages. At the first stage of observation i. e. at the 30th day of sowing, a significant reduction of these characters was noticed only at highest level of 30 kg N/ha whereas the 20kg level had not given a significant reduction.

The decrease in the nodulation observed due to application of N might be due to the fact that N fixing bacteria when supplied with readily available form became inactive and less efficient in fixing atmospheric N thereby retarding the formation of nodules, (Russel, 1961). Similar depressions in nodulation have been reported by Vijaya Kumar (1967) by nitrogen fertilization. The lack of a significant reduction in nodulation observed at the first stage by 20 kg N/ha might be due to the fact that during initial stages

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some quantity of nitrogen might be required for the plant till it became fully efficient to fix enough atmospheric N.

The application of P had significantly increased the number and weight of nodules per plant at all levels of P and stages of observation. Maximum number and weight of nodules were recorded by 100 kg level. Gopalakrishnan and Nagarajan (1958) and Punnoose (1968) also reported beneficial effects of P on nodulation in groundnut. The applied P might have stimulated the rapid multiplication of rhizobes (Raheja, 1966) which might have resulted in the formation of more number and weight of nodules. Out of the combinations, $N_1 P_3$ had given the maximum number and weight of nodules. This confirmed the individual effects of nutrients already discussed. Regarding the nodulation at different stages, it was seen that the same was at a minimum during the 30th day after sowing and reached a peak by the 60th day and by 90th day it considerably declined.

Table 1 showed that the effects of N and P are significant on *protein content of kernels*. The nitrogen levels at 20 and 30 kg/ha had recorded a significant increase in protein content over 10 kg level. The maximum protein content of 29 percent was recorded by the 30 kg N level. Since N enters in to the structure of chlorophyll and is a constituent of protein, the amount of protein in the plant is mainly dependant on the N availability in soil (Raheja, 1966) and the increase in protein content observed might be due to this specific role of N in the metabolism of plants. Similar results were reported by Nijawan (1962) and Punnoose (1968).

P application too had significantly increased the protein content at all levels, giving the maximum value of 29.4 per cent at 100 kg level. John (1949) also recorded similar evidences. The increase in protein content of seed with P application might possibly be due to its role in protein synthesis (Meyer and Anderson, 1952). It might also be imparted to the increased uptake of N by the plant in the presence of adequate P (Manjumdar, 1965). The combined application of N and P had significantly increased the percentage of protein upto 29.8 possibly due to the additive effect of nutrient N and P when given in suitable combination. This is also corroborated by the findings of Punnoose (1968) in groundnut.

The results presented in the table indicated that there was a decrease in the oil content with increasing levels of N in this variety. 30 kg level had recorded a significant reduction in oil content when compared to 20 and 10 kg levels. A similar decrease in oil content with N fertilization was recorded by Harigyam Singh *et al.* (1960) in sesamum and Punnoose (1968) in groundnut. This decrease in the oil content might possibly be due to an increase in protein content by N dressing, Miller (1938).

Table 1

Nodulation and quality of Asiriya Mwitunde groundnut as influenced by N and P fertilisation

Levels of Nutrients kg/ha.	No. of Nodules per plant			Mean weight of nodules in mg per plant			Percent- age of oil	Percent- age of protein
	30th day After sowing	60th day After sowing	90th day After sowing	30 days After sowing	60 days After sowing	90 days After sowing		
N ₁ (10)	58.3	257.9	82.9	89.3	772.3	164.6	50.4	28.3
N ₂ (20)	56.7	230.2	76.4	84.6	742.2	153.1	49.3	28.5
N ₃ (30)	53.0	180.8	70.8	79.1	675.3	142.1	47.0	29.0
P ₁ (50)	51.4	194.1	66.6	75.8	655.6	133.0	47.4	28.2
P ₂ (75)	56.7	221.8	76.9	85.4	723.8	153.1	49.0	28.6
P ₃ (100)	59.9	253.0	86.7	91.8	810.6	173.7	50.3	29.4
CD at 5% for levels of N & P	2.0	11.9	3.4	5.3	36.5	6.9	1.2	0.4
<i>Combinations</i>								
N ₁ P ₁	53.7	242.7	74.7	80.7	725.3	149.3	49.3	27.0
N ₁ P ₂	58.3	250.3	80.7	88.8	750.3	159.0	50.5	27.3
N ₁ P ₃	63.0	280.7	93.3	98.7	842.0	185.3	51.6	30.7
N ₂ P ₁ *	53.0	198.0	66.0	77.7	685.7	131.3	47.5	29.1
N ₂ P ₂	57.0	228.0	76.7	85.7	727.0	153.7	48.9	29.6
N ₂ P ₃	60.0	264.7	86.7	90.3	814.0	174.3	51.5	27.7
N ₃ P ₁	47.7	141.7	59.0	69.0	556.3	118.3	45.5	28.5
N ₃ P ₂	54.7	187.0	73.3	82.0	694.0	146.7	47.4	28.8
N ₃ P ₃	56.7	213.7	80.0	86.3	775.7	161.3	49.9	29.8
CD at 5% for combi- nations of N & P	3.5	20.7	5.9	9.2	63.3	12.0	2.1	0.7

P application had increased the oil content significantly at all levels. According to Miller (1938) formation of lecithin, an important form in which the fats occur in plants does not take place in the absence of P. Moreover the synthesis of fats and carbohydrates is also dependant on P in the form of ADP and ATP (Meyer and Anderson, 1952). The treatment combination of 10 kg N and 100 kg P had recorded the highest oil content of 51.6 percent and that of 30 kg N and 50 kg P had recorded the lowest oil content 45.5 percent,

Summary

An investigation was conducted at the Agricultural College Farm, Vellayani to study the effect of graded doses of N and P on nodulation, protein and oil content of Asiriya Mwitunde, a newly introduced high yielding variety of groundnut from Tanganiyaka. The number and weight of nodules were significantly reduced by, nitrogen at all stages. Whereas phosphorus application had significantly increased the same at all levels and stages. Maximum number and weight of nodules were recorded at the 60th day after sowing, Protein content of this variety was significantly increased by nitrogen and phosphorus and a maximum protein content of 29.8 percent was recorded by the treatment combination 30 kg nitrogen and 100 kg phosphorus per hectare. The oil content of the crop was significantly reduced by N application while the same was significantly enhanced by P dressing. The treatment combination of 10 kg N and 100 kg P had recorded the highest oil content of 51.6 per cent in this variety.

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സംഗ്രഹം

അസീരിയാമുട്ടണ്ടി എന്ന പുതിയ ഇനം കപ്പലണ്ടിക്ക് വിവിധ തോതുകളിൽ നൈട്രജൻ, ഫോസ്ഫോറസ്, എന്നീ സസ്യമൂലകങ്ങൾ ചേർന്നുപോകുന്ന ഫലം എന്തായിരിക്കുമെന്നറിയുന്നതിനായി 1969 ൽ ഒരു പരീക്ഷണം നടത്തുകയുണ്ടായി. ഇതിൽ നിന്നും നൈട്രജൻ ചേർക്കുന്നതു കാരണം മൂലാർബുദങ്ങളുടെ എണ്ണവും ഭൂതലവും കുറയുന്നതായി കണ്ടു. എന്നാൽ ഈ രണ്ടു ഗുണങ്ങളും ഫോസ്ഫോറസ് ചേർത്തപ്പോൾ വ്യക്തമായി വർദ്ധിക്കുകയുണ്ടായി. ഈ രണ്ടു മൂലകങ്ങളും മാന്ദ്യം വർദ്ധിപ്പിക്കുന്നതായി കണ്ടു. നൈട്രജൻ എണ്ണയുടെ തോതു് കുറയുകയും എന്നാൽ ഫോസ്ഫോറസ് എണ്ണയുടെ തോതു് കൂട്ടുന്നതായിട്ടുമാണ് അനുഭവപ്പെട്ടതു്. പത്തു കിലോഗ്രാം നൈട്രജനും, 100 കിലോഗ്രാം ഫോസ്ഫോറസും ചേർത്തു കൃഷിചെയ്യുന്നതിലാണ് ഏറ്റവും കൂടുതൽ എണ്ണയുല്പാദനം ഉണ്ടായതു്.

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