

EFFECT OF NITROGEN AND PHOSPHORUS ON ASIRIYA MWITUNDE GROUNDNUT IN KERALA*

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Introduction of high yielding varieties of crops is one of the steps to increase the production per hectare. Varieties of groundnut cultivated in Kerala at present are low fertility strains with limited yield potential. "Asiriya Mwitunde" a high yielding serai bunch variety from Tankaniyaka was introduced to India in 1963. This variety has given encouraging results in the tests conducted at the Regional Research Centre, Hyderabad as well as in the regional trials carried out in Tamil Nadu, Karnadaka, Maharashtra and Punjab (Kulkarni, *et al*, 1967). It is being grown extensively on cultivators fields in the above states. In Kerala no such attempt has been so far made either to exploit the potential of this variety under the agroclimatic conditions of the slate or to assess its manurial requirements. This investigation was, therefore, undertaken to evaluate the high fertilizer responsiveness of this variety to nitrogen and phosphorus under the soil and climatic conditions of Kerala.

Materials and Methods

The experiment was conducted at the Agricultural College Farm. The soil of the field was red loam with 0.065, 0.038, 0.072 per cent, potash, nitrogen, phosphorus respectively and a PH of 5.9. The treatments consisted of combinations of 3 levels of 10, 20 and 30 kg/ha of N and 3 levels of 50, 75 and 100 kg/ha of P. The design of the experiment was randomised block with three replications fitted in a 3^2 factorial combination. The plot size was 8×4 sq. m, and spacing adopted was 25 X 25 sq cm. with a seed rate of 80 kg/ha. Farm yard manure at 10 metric tons, potash at 50 kg and lime at 1000 kg/ha respectively were applied uniformly to all the plots. Nitrogen was given as ammonium sulphate and phosphorus as superphosphate. The fertilizers and farm yard manure were applied as basal dressing. Lime was applied just after the peg formation stage. The crop was harvested 143 days after sowing.

Results and Discussion

The results on growth, yield characters and yield of crop are presented in Table 1.

Table 1

Growth, yield characters and yield of Asiriya Mwitunde

Levels of nutrients kg/ha.	Height (cm)	No of leaves per plant	Haulm yield kg/ha	No of pods/plant	Weight of pods per plant (gm)	Weight of 100 kernels (gm)	Natural test weight (gm)	Shelling percentage	Yield of pods (kg/ha.)
N ₁ (10)	71.7	672	7779	31.9	40.9	54.1	168.8	75.0	2712
N ₂ (20)	74.1	718	8348	33.8	43.2	54.8	176.0	75.9	2893
N ₃ (30)	76.4	751	9210	35.2	44.6	55.4	178.7	76.7	2931
P ₁ (50)	72.6	689	7992	31.4	39.9	54.0	170.4	75.1	2764
P ₂ (75)	74.2	710	8466	33.9	42.6	54.9	174.8	75.8	2868
P ₃ (100)	75.4	741	8901	35.6	46.6	55.4	178.2	76.8	2903
CD at 5 % between levels of N & P.	1.5	11.0	499	1.1	2.7	0.5	2.0	0.9	58
<i>Combinations of N & P</i>									
N ₁ P ₁	69.7	644	7053	29.7	37.7	53.0	160.0	74.5	2646
N ₁ P ₂	72.0	663	7980	31.0	40.3	54.3	170.0	74.9	2771
N ₁ P ₃	73.3	710	8313	35.0	44.7	55.0	176.3	75.6	2719
N ₂ P ₁	73.0	694	8012	31.0	39.3	54.0	174.7	75.3	2771
N ₂ P ₂	74.0	716	8293	33.3	43.7	55.0	175.0	75.6	2969
N ₂ P ₃	75.4	743	8740	35.0	46.7	55.3	178.3	76.9	2938
N ₃ P ₁	75.0	720	8844	33.7	42.0	55.0	176.7	75.5	2875
N ₃ P ₂	76.6	752	9125	35.3	43.7	55.3	179.3	76.8	2865
N ₃ P ₃	77.7	769	9660	36.7	48.0	56.0	180.0	77.9	3052
C. D. at 5 % between combinations of N & P.	2.6	20.0	865	1.8	4.1	0.8	2.5	1.5	100

Height at maturity and number of leaves per plant:

Nitrogen had significantly increased these characters at all levels giving a maximum at 3 kg/ha. The response of these growth characters to N application might be attributed to the rapid meristematic activity in plants (Crowther, 1935 • Similar results due to N on groundnut were reported by Verma and Bajpai. (1964). P application at 75 kg/ha had also significantly influenced these characters probably because P is closely associated with cell division and development of meristematic tissue (Bear, 1955). The combined application of N_3P_3 has given maximum response of these characters.

Yield of haulm:

The yield of haulm was found significantly increased by N application at all levels. This might be due to the influence of N on the height and number of leaves per plant as already explained. P also had significantly increased the haulm yield upto 75 kg/ha. The increased cell division and cell elongation leading to increased meristematic activity as reported by Russel (1961) and better utilisation of N in the presence of adequate amount of P (Raheja, 1966) are some of the possible reasons for this response of P. It was also seen that maximum haulm yield was obtained at N_3P_3 level and this was on par with N_3P_2 and N_3P_1 . This showed that even though both N and P had exerted their individual effects in increasing the haulm yield, when they were combined the effect of N was more pronounced than that of P.

Number and weight of Pods per plant:

The mean number of pods per plant was increased significantly by the application of 20 and 30 kg N/ha over 10 kg level. Whereas the weight of pods had recorded a significant increase only at the 30 kg level. This might be attributed to the fact that N application helped to increase the formation of protein in the plant and thereby leading to an increase in the size of the plant which in turn synthesise carbohydrates at a faster rate and in larger quantities (Raheja, 1966) thereby leading to an enhancement of number and weight of pods. There was also a significant increase in the number and weight of pods at all levels of P. This may be explained as the beneficial effect of P on fruiting as reported by Cokefair (1931), and Buckman and Brady (1960). Combined application of N and P at the highest levels also significantly increased these characters and this result is in conformity with the findings of Punnoose (1968).

Weight of hundred kernels and natural test weight:

The kernel weight and natural test weight were increased significantly at all levels of N. Application of this nutrient might have increased total leaf area of the plant (Singh *et al.*, 1966) with a consequent increase in the photosynthates contributing to a corresponding increase in the weight of seeds in relation to its volume and number. These characters were also significantly increased by • the

levels of P. This might be attributed to its role in the metabolism of carbohydrates, fats and protein as reported by Bonner and Glaston (1951). The combined application of N₅ and P₅ level had recorded the maximum test weight and kernel weight which is corroborated by the findings of Punnoose (1968).

Shelling percentage:

The shelling percentage was influenced significantly by the N application at 20 kg level and it was on par with 30 kg N level. The better development of kernel by N application as already explained might have contributed to an increased shelling percentage. The significant increase in shelling percentage by the application of P at 100 kg level might be attributed to synthesis of carbohydrates, fats and proteins constituting the kernels.

Yield of pods

The N application had increased the pod yield upto 30 kg level even though it was significant only upto 20 kg level. The pod yield was influenced by the important yield attributes such as hundred pod weight and shelling percentage which were also not influenced by N beyond 20 kg level. This is in contrast to the results obtained by Katarki and Banahatti (1965), Maini and Nijhawan (1966) and Punnoose (1968), wherein they got responses only upto 10 kg level. More over it was also reported that only in soils where fertility status was poor, the groundnut crop had responded to higher levels of N, Nijhawan (1962) whereas this variety has responded to higher levels of N even in soils of medium fertility. This might be attributed to the high N responsiveness of the variety Asiriya Mwitunde.

The absence of a significant response beyond 20 kg N might be due to the possible utilisation of the excess N for increasing the height, number of leaves and haulm yield as is seen in Table 1, which were significantly increased upto 30 kg level.

Most of the previous workers on groundnut reported responses for phosphorus only upto 50 kg/ha, Panikker (1961), Chockhey Singh and Pathak (1969). However in the present investigation a significant response upto 75 kg phosphorus was obtained. This might be presumably due to high fertilizer responsiveness of this variety when compared to many local varieties. Kulkarni et al. (1967) also obtained a high response for phosphorus for the same variety.

The combined application of 20 kg nitrogen and 75 kg phosphorus also resulted in significant yield increase and it gave an yield of 2969 kg/ha. This can be ascribed to the additive effects of these nutrients when given in an optimum combination.

Summary

An experiment was conducted to assess the high fertilizer responsiveness of Asiriya Mwitunde, a groundnut variety introduced from Tanganiyaka in respect of N and P under the soil and climatic conditions of Kerala. The various growth characters such as height, leaf and haulm production were significantly increased by 30 kg N/ha. Application of P upto 100 kg/ha increased significantly the yield attributes such as weight of kernels, test weight, shelling percentage in this variety. Pod yield was significantly increased by 20 kg N and 75 kg P giving a per hectare yield of about 2969 kg/ha under the agro-climatic conditions of Kerala.

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സംഗ്രഹം

കേരളത്തിലെ മണ്ണിന്റെയും കാലാവസ്ഥയുടെയും അടിസ്ഥാനത്തിൽ, ടാങ്കാനിയയിൽ നിന്നും കൊണ്ടുവന്ന അസിരിയ മിട്യൂണ്ടി എന്ന നിലക്കടല വിത്തിനത്തിന്റെ നൈട്രജനും ഭാവഹവും എന്നീ രാസവളപ്രയോഗത്തോടുള്ള പ്രതികരണം അറിയുന്നതിനു ഒരു പരീക്ഷണം നടത്തപ്പെട്ടതിൽ നിന്ന് കിട്ടിയിരിക്കുന്ന ഫലങ്ങൾ roiosis* ചുരുക്കിപ്പറയുന്നു. പൊക്കം, സസ്യ ഭാഗങ്ങളുടെ ഉല്പാദനം തുടങ്ങിയ വിവിധ വളർച്ച സ്വഭാവങ്ങൾ ഹെക്ടറിന് 30 കിലോഗ്രാം നൈട്രജൻ എന്ന തോതിലുള്ള വളപ്രയോഗം ഗണ്യമായി വർദ്ധിപ്പിച്ചു. ഹെക്ടറിന് 100 കിലോഗ്രാം ഭാവഹം വരെയുള്ള രാസവളപ്രയോഗം ഈ ഇനത്തിന്റെ വിത്തിന്റെ രൂപം, പരീക്ഷണരൂപം, തോട്ടപാളിക്കുന്ന ശതമാനം തുടങ്ങിയ വിവിധ ഉല്പാദന ഉപാധികളെ ഗണ്യമായി അധികരിപ്പിച്ചു. തോട്ടപാളിക്കാത്ത നിലക്കടലയുടെ വിളവ് 20 കിലോഗ്രാം നൈട്രജനും, 75 കിലോഗ്രാം ഭാവഹവും ചേർത്ത് ഹെക്ടറിന് 2969 കിലോഗ്രാം എന്ന തോതിൽ ഉയർത്തി. അസിരിയ മിട്യൂണ്ടി എന്ന പുതിയ നിലക്കടല ഇനത്തിനെ മോഡുലേഷനിലും മാംസ്യത്തിലും എണ്ണയുടെ അളവിലും നൈട്രജന്റെയും ഭാവഹത്തിന്റെയും ഗ്രേഡഡ് ഡോസിനു മുളള ഫലം പാലിക്കുകയുണ്ടായി.

നോഡ്യൂംസിന്റെ എണ്ണവും രൂപവും നൈട്രജൻ കൊടുത്തതുകൊണ്ട് എല്ലാഘട്ടത്തിലും ഗണ്യമായി കുറഞ്ഞു. എന്നാൽ ഭാവഹപ്രയോഗം അതിനെ എല്ലാ നിലയിലും ഘട്ടത്തിലും ഗണ്യമായി അധികരിപ്പിച്ചു.

പാകി 60 ദിവസം കഴിഞ്ഞപ്പോൾ വേർച്ചകളുടെ എണ്ണവും രൂപവും ഏറ്റവും വർദ്ധിച്ചതായി കാണപ്പെട്ടു. നൈട്രജനും, ഭാവഹവും, മാംസ്യത്തിന്റെ അളവ് ഗണ്യമായി ഉയർത്തുകയും ഏറ്റവും കൂടുതൽ അളവായ 29.8 ശതമാനം വരെ ഉയർത്താൻ ഹെക്ടറിനറിന് 30 കിലോഗ്രാം നൈട്രജനും 100 കിലോഗ്രാം ഭാവഹവും ഉപകരിച്ചു. നൈട്രജൻ പ്രയോഗം മൂലം ഈ നിലക്കടലയുടെ എണ്ണത്തോളം ഗണ്യമായി കുറച്ചുകിലും, ഭാവഹപ്രയോഗം മൂലം അതു

ഗണ്യമായി ഉയർത്തപ്പെട്ടു. ഹെക്ടറോന്നിന് 10 കിലോഗ്രാം നൈട്രജനും 100 കിലോഗ്രാം ഫോസ്ഫറും എന്നതോതിലുള്ള കൂട്ടുപ്രയോഗം ഏറ്റവും കൂടിയ ഏണ്ണശതമാനമായ 51.6 ശതമാനം നൽകി.

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