

EFFECT OF DIFFERENT LEVELS OF NITROGEN AND PHOSPHORUS ON THE UPTAKE OF NITROGEN AND PHOSPHORUS AT VARIOUS STAGES OF GROWTH OF SUNFLOWER VARIETY "PEREDOVIK"

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Karastan and Boshkanyan (1966) reported that the percentage content of nitrogen and phosphorus were greatest in the initial stages of development in sunflower plant. At maturity nitrogen and phosphorus moved into reproductive organs from vegetative organs. Robinson (1970) also reported that concentration of phosphorus declined with the age in stems, leaves and receptacle. The present investigation was taken up to study the effect of different levels of nitrogen and phosphorus on the uptake of these nutrients at different growth stages.

Materials and Methods

The field experiment was laid out at the farm attached to the College of Agriculture, Vellayani under irrigated conditions. Analysis of the experimental soil showed a total N content of 0.046% total and available P_2O_5 of 0.042% and 0.0071% respectively and a pH of 5.4. Treatments consisted of combinations of three levels of nitrogen (0, 45 and 90kg N/ha) and Four of phosphorus (0, 30, 60 and 90 kg P_2O_5 /ha). The experiment was laid out in randomized block design with three replications. Half of the nitrogen dose and the full dose of phosphorus along with a common dose of 40 kg K_2O /ha were applied at the time of planting. The remaining half of the nitrogen was top dressed one month after planting. Spacing adopted was 30 cm between rows and 15 cm between plants. A sample of four plants was drawn at random from individual plots for chemical analysis at three stages viz. 20th day, flowering and harvest. Nitrogen contents of plant samples at the three stages were estimated by the Modified Microkjeldhal method and phosphorus content by colorimetry (Jakson, 1962).

Results and Discussion

Uptake of nitrogen

The data on uptake of nitrogen by plants at different stages of growth are presented in the Table. 1

During all the stages of growth, nitrogen at 90 kg/ha was found to be superior to the other two levels. Except during the 20th day of planting, nitrogen at 45 kg was significantly superior to no nitrogen application. The

Table 1
Effect of levels of nitrogen and phosphorus on the uptake of nitrogen and phosphorus (kg/ha) at different stages of growth of sunflower

Treatments	Uptake of Nitrogen (kg/ha)			Uptake of Phosphorus (kg/ha)		
	20th day	Flowering	Harvest	20th day	Flowering	Harvest
<i>Nitrogen (kg/ha)</i>						
0	6.67	13.21	29.75	0.42	1.93	5.12
45	8.34	37.47	55.74	0.57	3.85	6.90
90	10.68	54.21	73.39	0.76	5.78	8.13
Test	sig	sig	sig	sig	sig	sig
S. Em +	0.73	1.89	3.57	0.05	0.22	0.21
C. D. (0.05)	2.29	5.55	10.47	0.15	0.65	0.62
<i>Phosphorus (kg P₂O₅/ha)</i>						
0	5.84	31.60	51.36	0.45	3.33	5.77
30	8.89	36.33	51.43	0.56	4.05	6.67
60	8.40	37.26	59.63	0.63	4.32	8.04
90	11.11	34.65	49.38	0.63	3.70	6.39
F Test	sig	NS	NS	NS	NS	NS
S. Em +	0.91	2.19	4.02	0.06	0.25	0.76
C. D. (0.05)	2.68					

significantly higher uptake at 90 kg level suggests the insufficiency of the nutrient in soil at zero and 45 kg levels.

During 20th day after planting, the effect of phosphorus was found to be significant on the uptake of nitrogen. The same influence was noted during this period in the case of vegetative characters like height of the plant and total dry matter production. As indicated by the lack of significant response in content of nitrogen due to phosphorus supply, enhancement in nitrogen uptake was mainly contributed by increased growth of aerial tissues. At later stages of growth, however, treatment differences ceased to show statistical significance both in nitrogen uptake and growth performance.

Nitrogen uptake was found to increase as the crop approached maturity, the trend of variation over the stages remaining almost the same at all levels of nitrogen supply. The rate of increase from 20th day to flowering was more conspicuous than that from flowering to harvesting time. The increasing trend of nitrogen uptake may be attributed to the continued requirement of nitrogen by the crop during the flowering and seed development stages. One of the factors responsible for the observed slow rate of increase in nitrogen uptake from flowering till harvest may be the natural loss of dry matter by death and decay of vegetative tissues.

Uptake of phosphorus during successive stages of growth of sunflower

From the data presented in the Table 1, it is seen that nitrogen significantly influenced the total uptake of phosphorus during all the three stages of growth. There was significant superiority of 90 kg N/ha over 45 kg and that of 45 kg N/ha over control,

The reason for increased uptake of phosphorus by nitrogen application can be attributed to the better root proliferation that favoured better phosphorus uptake and the increased vegetative growth.

The effect of phosphorus was not significant in increasing phosphorus uptake by plant at any of the stages studied. Such a behavioral pattern suggests adequacy of soil supplies of this element to support the crop. Combined effect of N and P was not found significant.

Over the stages, there was a linear increase from 20th day to harvest, there being no conspicuous differences between treatments in the pattern. This indicates that sunflower is a steady feeder with respect to phosphorus.

Summary

An experiment was conducted at the College of Agriculture, Vellayani to study the effect of graded doses of nitrogen and phosphorus on the uptake of nitrogen and phosphorus at three growth stages of sunflower *viz* 20th day after planting, flowering and harvest. The effect of nitrogen up to 90 kg/ha resulted in significant linear increase in nitrogen uptake at all the stages except on the 20th day after planting. Phosphorus at 90 kg level showed significance in enhanced nitrogen uptake at the 20th day of planting but not later. While for the phosphorus uptake, significant effect was noticed due to increased levels of application of nitrogen at all the three stages, levels of applied phosphorus did not bring about significant changes in the uptake of this nutrient. Increase in uptake of these nutrients showed a linear relationship with the magnitude of growth of the plants.

സംഗ്രഹം

സൂര്യകാന്തിച്ചെടിക്കൂട്ടം നൈട്രജൻ, ഫോസ്ഫറസ് എന്നീ സസ്യമൂലകങ്ങൾ വിവിധ അളവിൽ നൽകുന്നതുമൂലം ചെടി വലിച്ചെടുക്കുന്ന നൈട്രജൻ, ഫോസ്ഫറസ് എന്നീ മൂലകങ്ങളുടെ അളവിലുണ്ടാകുന്ന വ്യത്യാസം മനസ്സിലാക്കുന്നതിനു വേണ്ടി ഒരു പരീക്ഷണം വെള്ളായണി കാർഷിക കോളേജിൽ നടത്തുകയുണ്ടായി. ഫെക്ടറോറിനു 90 കിലോഗ്രാം നൈട്രജൻ നൽകിയപ്പോൾ നട്ടു 20-ാം ദിവസമൊഴിച്ചു ബാക്കിയെല്ലാ സമയങ്ങളിലും ആഗിരണം വർദ്ധിക്കുകയുണ്ടായി. ഫെക്ടറോറിനു 90 കിലോഗ്രാം ഫോസ്ഫറസ് നൽകിയപ്പോൾ നട്ടു 20-ാം ദിവസം നൈട്രജൻ ആഗിരണം കൂടിയെങ്കിലും പിന്നീടുള്ള ഘട്ടങ്ങളിൽ ഈ ഗുണം കുറയുകയും ചെയ്തു. നൈട്രജൻ കൂടുതൽ കൊടുക്കുന്നതിനനുസരിച്ചു ഫോസ്ഫറസിന്റെ ആഗിരണം കൂടുതലുണ്ടായെങ്കിലും ഫോസ്ഫറസിന്റെ അളവ് കൂട്ടിക്കൊടുക്കുന്നതു കൊണ്ടു അതിന്റെ ആഗിരണത്തിനു സാരമായ വ്യത്യാസം സംഭവിക്കുന്നില്ലെന്ന് തെളിഞ്ഞു.

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