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Effect of Farmyard Manure and Nitrogen on Potato (*Solanum tuberosum* L.) Variety Kufri Sinduri (C-140)

By

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ABSTRACT

Farmyard manure at 500 and 1000 q/ha enhanced plant growth. The shoot dry matter increased with increase in the rates of FYM, but 1000 q/ha proved to be the best level. Nitrogen at 200 kg/ha increased plant height over other levels. The shoot dry matter production was significantly lower under control and 50 kg nitrogen at all stages of the growth as compared to 100 and 200 kg levels. The maximum yield potential was obtained only when 1000 q/ha FYM were applied in combination with 100 kg/Nitrogen. Two hundred kg/ha nitrogen had depressing effect on tuber yields.

INTRODUCTION

Being a tuber crop, potato requires comparatively organic matter rich soils with high contents of nitrogen, phosphorus and potassium. In general, Tarai soils are inherently rich in phosphorus and potassium but having low status of nitrogen. For better tuberization and higher yields addition of FYM in combination with nitrogen was reported to be good by Singh and Singh (1971). Similar positive influences of association of FYM and nitrogen have also been reported by Dimitrov (1964), Below (1968) and Shloma (1968).

MATERIALS AND METHODS

The present study was undertaken during 1967—'68 and 1968—'69 at the Experiment Station, G. B. Pant Univ. of Agric. and Tech., Pantnagar (Nainital). There were four levels of FYM (0, 250, 500 and 1000 q ha) and nitrogen (0, 50, 100 and 200 kg ha in the form of ammonium sulphate). The experiment was laid out in a randomised block design with three replications. The gross plot sizes were 4.2×3.3 m and 4.5×4.2 m during 1967—'68 and 1968—'69 respectively, whereas the net plot size was 3×3 m in both the years. The variety under experiment was Kufri Sinduri (c-140). The composite sample of FYM was analysed in Soil Testing Laboratory of the University. The chemical constituents were total nitrogen (0.62 per cent), total phosphorus (0.90 per cent and total potassium (0.65 per cent).

Plant height was recorded on 45, 60, 75 and 90 days after planting, and data were analysed statistically. Plant samples for dry matter were kept in an electric oven at 90°c for an hour followed by drying at 60°c for 24 hours. When thoroughly dried, the samples were weighed to get constant readings. For the final tuber yield the net area of 3×3 m was harvested and hectare yield was calculated.

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RESULTS AND DISCUSSION

Plant height: Plant height did not differ significantly due to 250, 500 and 1000 q/ha FYM levels, but these had significant effect in increasing the plant height over control (Table 1). The ord erof effect of different levels of FYM was 1000 = 500 = 250 > 0. As the rates of nitrogen increased, the shoot height also increased at all stages of plant growth. Lower levels of nitrogen (50 and 100 kg/ha) could not increase plant height significantly and the order of increment in shoot height due to nitrogen was 200 > 100 = 50 > 0.

Shoot dry matter: The dry matter yield increased with age of the crop (upto 75 days of planting) and the rates of FYM (Table 1). There was great increase in dry matter production due to various rates of FYM and nitrogen upto 45 days of planting. Further addition in dry matter yield was upto 75 days of planting under all levels of FYM and nitrogen. The highest level of FYM caused greatest dry matter production. There was insignificant difference between the effects of 250 and 500 quintals of FYM levels, but effects of these levels were significant over control. Probably, it was due to poor plant height.

The dry matter production was significantly influenced also by nitrogen levels. It is interesting to note (Table 1) that the dry matter production was significantly lower under control and

TABLE 1. Effect of FYM and nitrogen on plant height (cm) and dry matter (gm/plant)

Treatments	Days after planting							
	45		60		75		90	
	height	d. m.	height	d. m.	height	d. m.	height	d. m.
Levels of FYM								
0	35	14	58	15	65	16	67	15
250	39	10	70	14	76	20	79	16
500	41	12	65	17	72	19	78	17
1000	43	14	68	23	75	22	79	18
C. D. at 5%	—	—	—	—	—	2.8	7.0	—
Levels of nitrogen								
0	36	9	60	10	64	18	65	16
50	36	12	66	18	70	18	73	16
100	39	16	67	20	73	19	76	16
200	46	13	66	20	77	23	85	18
C. D. at 5%	—	—	—	—	—	2.8	7.0	—

50 kg nitrogen level at all stages of plant growth as compared to 100 and 200 kg/ha levels. The greatest dry matter production in 200 kg nitrogen plots, however, observed at 75 days after planting. The plant height under this level was optimum which led to produce stocky stems which in turn accumulated more dry matter per plant at 75 days after planting.

Tuber yield: It is clear that increase in mean yield was due to various levels of FYM over zero level (Table 2). Only 1000 quintals FYM per hectare produced maximum tuber yield. Similarly, mean yield was also increased due to various levels of nitrogen over zero level in the absence of FYM. The maximum increase in yield was at 100 kg nitrogen level. Nitrogen 200 kg per hectare produced depressing effects on tuber yields. However, the best combination was that of 100 kg nitrogen and 1000 quintals FYM. The increase in yield by this treatment over control was more than the total increase by 100 kg nitrogen or 1000 quintals FYM alone. These effects were probably due to improvement in soil physical conditions which led to better environment for tuberization and yield. These results are in agreement with the results of Wickens (1963), Below (1968), Dimitrov (1968) and Singh and Singh (1971).

It may be advocated that the improvement in crop environment is essential for tuberization. It has either to be provided by addition of organic manures or by some other way in order to achieve a desired yield potential of potato crop.

TABLE 2. Potato tuber yield (q/ha) under various treatments

FYM levels (q/ha)	Nitrogen levels (kg/ha)					
	0 kg	50 kg	100 kg	200 kg	Mean	Increase over FYM zero level
0	290	374	389	389	380.5	...
250	353	359	422	422	389.0	9.5
500	364	390	414	411	394.7	14.5
1000	420	447	541	412	455.0	74.5
Mean	356.7	392.5	441.5	408.5	—	—
Increase over nitrogen zero level		35.8	84.8	51.8	—	—

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