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Nutrient removal by weeds and maize (*Zea mays*)

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Maize (*Zea mays* L.) is one of the most important grain crops grown in Andhra Pradesh with an average yield of 1,700 kg/ha compared with national average of 1,474 kg/ha. There is vast scope to raise its productivity through agronomic management. Weeds form the major factor in limiting the yield by causing considerable nutrient loss in maize crop recorded up to 62, 24 and 124 kg/ha of N, P and K respectively (Vishwanath, 1978).

A field experiment was conducted at the Agricultural College Farm, Rajendranagar, Hyderabad, during the rainy season (*kharif*) of 1991, to assess the removal of N, P and K both by crop and weeds under different weed-management practices as treatments (Table 1). The experimental soil was sandy loam (Alfisols) in texture with low in available N (226 kg/ha) and P (18.5 kg/ha), and medium in available K (235 kg/ha) having pH 7.6. The experiment was laid out in randomized block design and replicated thrice. Maize cv. 'DHM 105' was sown on 2 July 1991 and harvested on 21 October 1991. Estimated values of N, P and K uptake by weeds as well as maize plant at harvest are presented in Table 1.

The removal of nutrients by weeds showed a great impact on the availability of nutrients to the crop thus affecting its dry-matter accumulation. The nutrient removal by both crop and weeds were significantly influenced by different weed-management practices. The weeds under unweeded check recorded the highest uptake of NPK nutrients on account of higher weed dry weight. The weed-management practices caused significant reduction in N, P and K uptake by weeds. The treatments atrazine @ 1.0 kg/ha + 2, 4-D Na salt @ 0.5 kg/ha and atrazine @ 1.0 kg/ha + glyphosate @ 1.0 kg/ha were found effective next only to the farmers, practice in giving higher crop-dry matter as well as N, P and K uptake by the crop compared with other treatments including the unweeded check which recorded the lowest values. The former 2 treatments were at par with each other. This was probably due to higher crop-dry matter on account of less weed competition as evident from low dry-weed weight.

Angiras and Singh (1989) also reported the increased uptake of NPK nutrients by maize crop due to chemical weed control compared with the unweeded control. It is evident that the crop–weed competition in the unweeded check exerted an adverse effect on the uptake and utilization of nutrients by crop and thus result in low croped dry matter.

The nutrient uptake by the crop can be increased by effectively checking the weed growth with the pre-emergence application of atrazine @ 1.0 kg/ha + post-emergence application of 2, 4-D Na salt @ 0.5 kg/ha or

Table 1. Effect of weed-control treatments on dry-matter production and nutrient uptake by maize and weeds

Treatment (kg/ha)	Weed dry matter	Uptake by weeds (kg/ha)			Maize dry matter (g/plant)	Uptake by crop (kg/ha)		
		N	P_2O_5	K_2O		N	P_2O_5	K_2O
Atrazine 1.5 (pre-em.)	180.2	44.6	6.9	36.9	125.3	187.6	29.3	165.0
Atrazine 1.0 (pre-em.) + 2, 4-D Na salt 0.5 (post-em.) at 35–40 days*	151.6	35.5	4.4	32.4	144.0	206.3	40.3	183.2
Atrazine 1.0 (pre-em.) + glyphosate 1.0 (post-em.) at 35–40 days*	146.7	34.4	4.3	32.1	142.0	205.8	40.1	182.9
Atrazine 1.0 (pre-em.) + intercultivation at 30 days*	183.4	45.0	7.1	36.9	123.1	185.8	28.6	162.6
Pendimathalin 1.5 (pre-em.)	181.3	44.7	7.0	36.9	124.7	187.1	29.1	164.2
Pendimethalin 1.0 (pre-em.) + 2, 4D Na salt 0.5 (post-em.)	164.3	38.5	5.5	33.7	137.2	199.4	37.3	117.6
Pendimethalin 1.0 (pre-em.) + glyphosate 1.0 (post-em.)	160.2	37.9	5.2	33.5	136.1	198.7	36.9	177.1
Pendimethalin 1.0 (post-em.) + intercultivation (30 days*)	184.2	45.3	7.1	37.0	122.6	185.3	28.0	162.1
Oxyfluorfen 0.2 (pre-em.)	182.1	44.9	7.0	36.9	121.0	186.6	28.9	164.0
Oxyfluorfen 0.15 (pre-em.) + 2, 4-D Na salt 0.5 (post-em.)	174.7	42.2	6.2	35.1	131.0	194.2	34.2	172.0
Oxyfluorfen 0.15 (pre-em.) + glyphosate 1.0 (post-em.)	170.3	41.9	6.5	34.8	130.2	193.6	33.6	171.6
Oxyfluorfen 0.15 (pre-em.) + intercultivation (30 days*)	187.3	45.6	7.2	37.2	121.9	184.7	27.7	161.6
Farmers, practice (intervultivation at 20 days* and hand-weeding at 30 days*)	127.4	32.4	5.3	38.9	123.8	186.2	27.8	163.3
Unweeded check	239.4	52.3	9.6	38.9	62.1	145.1	21.3	129.2
CD (P = 0.05)	8.0	1.2	0.4	0.9	3.6	4.0	2.1	3.9

*Days after-sowing

glyphosate @ 1.0 kg/ha at 35-40 days after sowing.

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Response of rice bean (*Vigna umbellata*) to planting geometry

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The grain legumes have assumed a great importance as a source of protein-rich food among vegetarian population in India. Besides traditional tropical pulses, (chickpea, pigeonpea, greengram, lentil, etc.) many other non-traditional under-utilized legumes such as rice bean, winged bean, marama bean, have recently gained attention as supplementry food crops (Chandel and Singh, 1984). However, no systematic research work has been carried out on the improvement of their cultivation practices so far. An effort was therefore made to standardize the planting geometry of commonly grown local strain of rice bean under rainfed conditions of Uttar Pradesh hills.

A field experiment consisting of 3 row-to-row spacings (30.0, 37.5 and 45.0 cm) and 3 plant-to-plant spacings (5, 10 and 15 cm) was condcted at Hill Campus, Ranichauri, Tehri Garhwal, during the rainy season (*kharif*) of 1988 and 1989. Nine treatment combinations with 4 replications were tested in randomized block design. Since there was no improved variety recommended for the hill zone of Uttar Pradesh, a commonly grown 'Local' cultivar of semi-determinate type was sown on 20 and 18 June and harvested on 16 and 12 November in 1988 and 1989 respectively. All the fertilizers were applied at the time of sowing @ 20 kg N/ha and 50 kg P_2O_5/ha.

The experimental site was situated at an elevation of 1,750–1,760 m mean sea-level on north facing. The soil of the experimental field was silty clay-loam (Inceptisol) with 1.5–2.0 cm depth. The pH of the soil was 5.8–6.0. The experiment soil was low in available nitrogen (200–220 kg N/ha) and phosphorus (8–10 kg P_2O_5/ha, whereas rich in potassium (345–385 kg