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## Nutrient uptake studies in summer greengram [*Vigna radiata* (L.) wilczek]

**Anmol Chugh, SL Mundra and Kaushal Kishor**

### Abstract

A field experiment was conducted during summer season of 2016 at Instructional Farm of Rajasthan College of Agriculture, Udaipur to study nutrient uptake in summer greengram [*Vigna radiata* (L.) wilczek]. Under various treatment of experiment, PE application of ready-mix of pendimethalin + imazethapyr 0.75 kg ha<sup>-1</sup> recorded the maximum uptake of nutrients (N, P and S) both by grain (25.03, 3.13 and 1.60 kg ha<sup>-1</sup>, respectively) and straw (29.50, 3.67 and 1.39 kg ha<sup>-1</sup>, respectively), thus recorded with the maximum yield.

**Keywords:** Greengram, pendimethalin, imazethapyr, nutrient uptake, pre-emergence and post-emergence

### Introduction

Greengram [*Vigna radiata* (L.) Wilczek] commonly known as “mungbean” is one of the important short duration pulse crops grown in India. It ranks third among all the pulses grown in India after chickpea and pigeonpea (Tamang *et al.*, 2015) [5]. It is also known as golden gram, mash bean, celera bean, green bean and green soy. It belongs to family leguminosae. There are three sub groups of *Vigna radiata*, one is cultivated (*Vigna radiata* sub species radiata), and two are wild (*Vigna radiata* sub species sublobata and *Vigna radiata* sub species glabra). It is diploid with chromosome number 2n = 22. The seeds of greengram are highly nutritious with protein, carbohydrates, minerals and vitamins. Proteins are rich in lysine, leucine, threonine but poor in methionine, tryptophane, tyrosine. Lysine concentration is comparatively large and that is why the protein of greengram is an excellent complement to cereals particularly rice in terms of balanced human nutrition. Every 100 g of edible portion of greengram seed contains 75 mg calcium, 4.5 mg phosphorus, 24.5 g protein and 348 kilocalories energy (Meena *et al.*, 2013) [2].

### Material and methods

A field experiment was carried out at Rajasthan College of Agriculture, MPUAT, Udaipur. The soil was medium in nitrogen (285 kg ha<sup>-1</sup>), phosphorus (20.42 kg ha<sup>-1</sup>) and low in sulphur content (9.8 ppm). The experiment comprised of five weed management practices (PE application of ready-mix of pendimethalin + imazethapyr 0.75 kg ha<sup>-1</sup>, imazethapyr 100 g ha<sup>-1</sup> as post emergence 25 DAS, ready-mix of imazethapyr + imazamox 0.05 kg ha<sup>-1</sup> as post emergence 25 DAS, hoeing and weeding 25 DAS and weedy check) and three sulphur treatments (0, 20 and 40 kg ha<sup>-1</sup>) thereby making fifteen treatment combinations. All herbicides were applied with knapsack sprayer with flat fan nozzle and as per treatment sulphur was drilled in furrows through mineral gypsum containing 13 per cent sulphur at the time of sowing along with the basal dose of fertilizer. The experiment was laid out in Factorial Randomized Block Design replicated thrice. The following standard methods for analysis of nutrients were adopted.

The following standard methods for analysis of nutrients were adopted.

- (i) Nitrogen : Nessler's reagent colorimetric method (Lindner, 1944) [1]
- (ii) Phosphorus : Ammonium vanadomolybdate yellow colour method (Richards, 1968) [3]
- (iii) Sulphur : Barium chloride gelatin reagent turbidimetric method (Tabatabai and Bremner, 1970) [4]

Uptake of N, P and S was estimated using the following formula:

Nutrient content in

$$\text{Nutrient uptake} = \frac{\text{Sample (Plant or weed) (\%)} \times \text{Total dry bio mass (plant/ weed) (kg ha}^{-1}\text{)}}{100} \text{ (kg ha}^{-1}\text{)}$$

Greengram variety 'SML-668' was used as test crop with the seed rate of 20 kg ha<sup>-1</sup> following the packages as per the zone.

## Results and Discussion

### Effect on nutrient uptake by weeds

Critical analysis of data presented in Table.1 reveal that in comparison to weedy check, application of different herbicides and manual weeding brought about significant reduction in N uptake by weeds. Data further show a minimum depletion of N was noted under PE application of ready-mix of pendimethalin + imazethapyr and the maximum

depletion of N was recorded under weedy check. Similar results were observed in case of phosphorus and sulphur. The lowest total uptake of N, P and S by weeds was recorded with PE application of ready-mix of pendimethalin + imazethapyr during the experimentation. Nutrient uptake is the product of per cent nutrient content and biomass, thus similarity in the trend of uptake and total weed biomass production was an expected outcome. As this treatment was observed with minimum weed bio-mass due to several facts. Further in case of sulphur Application different doses of sulphur had no significant impact on N, P and S uptake by all kind of weeds.

**Table 1:** Nutrient uptake studies in weeds in summer greengram

Treatments	Total N uptake (kg ha <sup>-1</sup> )	Total P uptake (kg ha <sup>-1</sup> )	Total S uptake (kg ha <sup>-1</sup> )
Weed Management			
Pendimethalin+imazethapyr 0.75 kg ha <sup>-1</sup> (PE)	12.78	1.84	0.77
Imazethapyr 100 g ha <sup>-1</sup> (PoE)	22.56	3.30	1.33
Imazethapyr+imazamox 0.05 kg ha <sup>-1</sup> (PoE)	20.33	2.97	1.28
Hoeing and weeding 25 DAS	25.31	3.55	1.44
Weedy check	46.27	6.69	2.89
SEm±	1.42	0.20	0.10
CD (P=0.05)	4.11	0.58	0.30
SULPHUR LEVELS (kg ha <sup>-1</sup> )			
0	23.47	3.35	1.42
20	25.48	3.82	1.56
40	27.40	3.84	1.65
SEm±	1.10	0.16	0.08
CD (P=0.05)	NS	NS	NS

PE= Pre-emergence, PoE= Post-emergence

### Effect on nutrient uptake by crop

An appraisal of data (Table.2) shows that all the weed control treatments recorded significant increase in N uptake both by grain as well as by straw in greengram over weedy check. Data further indicate that PE application of ready-mix of pendimethalin + imazethapyr recorded maximum N uptake by grain, straw and thereby total N uptake by crop with 25.03, 29.50 and 54.52 kg N ha<sup>-1</sup>, respectively and thus boosted 13.14 and 11.69 kg N uptake by grain and straw, respectively compared to weedy check. All the weed control measures tended to improve the uptake of nitrogen, phosphorus and sulphur by grain and straw significantly compared to weedy check (Table.2). The highest N, P and S uptake by the crop was recorded under ready-mix of pendimethalin + imazethapyr due to the fact that nutrient uptake is primarily a function of yield and nutrient content. Thus, higher uptake by crop may be due to decreased crop-weed competition has concurrently increased nutrient availability, better crop

growth and higher crop biomass production coupled with more nutrient content. In case of sulphur application 20 and 40 kg S ha<sup>-1</sup> gave significantly higher N uptake by grain and straw over control. The per cent increase in N uptake by grain due to 20 and 40 kg S ha<sup>-1</sup> was 24.92 and 49.69, respectively compared to control, by straw due to 20 and 40 kg S ha<sup>-1</sup> was 23.50 and 45.91, respectively compared to control. Similar trend was observed in case of phosphorus and sulphur. The analysis of plants parts i.e. grain and straw at harvest of crop revealed that different sulphur levels significantly influenced N, P and S content in grain and straw. The highest uptake of N, P and S was observed under 40 kg S ha<sup>-1</sup>. Reviewing the work done on effect of gypsum application to a variety of crops, it was inferred that its application promoted root growth. Better root growth can therefore be responsible for greater extraction of nutrients. Nutrient uptake by crop is a function of their concentration and dry matter production of plants.

**Table 2:** Nutrient uptake studies in crop in summer greengram

Treatments	N uptake (kg ha <sup>-1</sup> )		P uptake (kg ha <sup>-1</sup> )		S uptake (kg ha <sup>-1</sup> )	
	Grain	straw	Grain	Straw	Grain	Straw
Weed Management						
Pendimethalin+Imazethapyr 0.75 Kg Ha <sup>-1</sup> (PE)	25.03	29.50	3.13	3.67	1.60	1.39
Imazethapyr 100 G Ha <sup>-1</sup> (Poe)	17.70	23.79	2.06	2.77	1.07	1.04
Imazethapyr+Imazamox 0.05 Kg Ha <sup>-1</sup> (Poe)	18.90	23.32	2.24	2.61	1.16	1.16
Hoeing And Weeding 25 DAS	18.43	23.73	2.17	2.75	1.29	1.22
Weedy Check	11.89	17.81	1.34	2.15	0.80	0.67
SEm±	1.01	1.05	0.09	0.11	0.05	0.04
Cd (P=0.05)	2.93	3.04	0.27	0.30	0.15	0.12
SULPHUR LEVELS (Kg Ha <sup>-1</sup> )						
0	14.73	19.19	1.74	2.28	0.96	0.91
20	18.40	23.70	2.21	2.80	1.20	1.10
40	22.05	28.00	2.62	3.30	1.40	1.27
SEm±	0.78	0.81	0.07	0.08	0.04	0.03
Cd (P=0.05)	2.27	2.36	0.02	0.24	0.12	0.09

PE= Pre-emergence, PoE= Post-emergence

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