

Original Research Article

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## Nutrient Uptake Pattern of Some Chickpea (*Cicer arietinum* L) Varieties

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### ABSTRACT

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Chickpea, uptake pattern

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The climatic condition of Assam is suitable for cultivation of chickpea (*Cicer arietinum* L). However, chickpea is not a regular crop of Assam, as such to introduce it in the state an AICRP project on Chickpea was initiated at Shillongani to find out a suitable variety and agrotechniques for Assam condition which would yield high yield and also improve / maintain soil health. With this objective in mind a few varieties were tested in Assam at Shillongani in the district of Nagaon, Assam. The crop was given a fertilizer dose of N 20, P 20 and K 0 kg ha<sup>-1</sup>). Seeds of the varieties were sown on 28.11.2023 and harvested in April 2024. The varieties tested were IPC 2004-90, WCG 2000-14, GPBC -2, BG -2076, JG 2-44, GJG -0408, JSC -48, CSJ -486, GJG -0501, PG -9758 -6, JG -2-25, GL -23094 received from AICRP on Chickpea.

### Introduction

Worldwide chickpea is grown as one of the most important pulse crop as it is one of the best source of vegetable protein. It is cultivated within a wide range of climatic condition from arid and semi-arid areas in more than 50 countries across the globe, in places where there is a wide variation of climatic conditions. In the developing countries it is a rich source of protein. Chickpea is mainly produced in developing countries, where more than 90% of chickpea production is consumed locally. The main chickpea-producing and consuming region is the Indian subcontinent consuming about almost 70% of the world's production.

Worldwide more than 2.3 billion people are affected by one or more forms of malnutrition, which is strongly related to malnutrition. Chickpea being a good and cheap

source of protein is consumed largely in the developing countries. Chickpea is one of the most important pulse crops worldwide, being an excellent source of protein. It is grown under rain-fed conditions averaging yields of 1 t/ha, far from its potential of 6 t/ha under optimum conditions. The combined effects of heat, cold, drought, and salinity affect species productivity. Chickpea is a good source of vegetable protein and has a high content of it. In the North eastern states of India it is a good source of vegetable protein. But no varieties are available locally for growing. As such with the help of AICRP on Chickpea a few varieties were tested at Nagaon Assam to find out their protein content and uptake pattern.

### Materials and Methods

Soil samples were collected before sowing and after harvest of the crop, plant samples were also collected

after harvest and were dried and analyzed using standard procedures (Jackson, 1973), whereas available soil N and plant N content were determined in Kel Plus Auto analyser, The initial soil properties of the experimental field is as follows:

**Results and Discussion**

The soil available nutrient content after harvest of the crop were analysed and it was observed that the here was a decrease in the available N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O content in all the plots from the initial values (Table 1).

It was observed that the yield was highest in case of JG – 2 – 25 (Table 2) which took a longer crop duration of 130 days, whereas the variety PG – 9758 – 6 recorded the lowest yield of 481 kg ha<sup>-1</sup> taking a duration of 127 days for maturity. The longest duration (135 days) for attaining maturity was taken by the variety IPC 2004 –

90 giving an yield of 1056 kg ha<sup>-1</sup> whereas JSC – 48 and CSJ – 486 and took the shortest duration of 124 days giving a yield of 907 and 1009 kg ha<sup>-1</sup> respectively. However, when the per day yield of the varieties were taken into consideration the variety JG – 2 – 25 gave the highest yield of 8.63 kg day<sup>-1</sup> and the variety PG – 9758 – 6 recorded the lowest per day yield of 3.79 kg day<sup>-1</sup>.

When the plant nutrient content was analyzed (Table 3) for all the varieties the highest N content was observed in the variety GPBC – 2 (3.42%) whereas the variety GL – 23094 recorded the lowest N content of 3.30 %. Similarly in case of plant P content the lowest was recorded in the variety CSJ – 486 (0.35 %) and highest in JG 2 – 44 and GJG – 0501 (0.42 %). When the plant K content was considered the variety JSC – 48 recorded the highest value (3.5%) and the lowest was observed in the variety PG – 9758 – 6 (2.8%).

**Table.1 Soil Parameters**

Soil Parameters	
pH	5.7
Organic carbon (%)	0.96
Available N (kg ha <sup>-1</sup> )	259.1
Available P <sub>2</sub> O <sub>5</sub> (kg ha <sup>-1</sup> )	20.6
Available K <sub>2</sub> O (kg ha <sup>-1</sup> )	120.8

**Table.2 Soil available plant Nutrients after harvest of crop (kg ha<sup>-1</sup>)**

Sl. No.	Variety	pH	Org. C	N	P	K
1.	IPC 2004 - 90	5.6	0.98	233.2	8.56	99.3
2.	WCG 2000 - 14	5.3	0.98	249.1	8.08	98.0
3.	GPBC - 2	5.6	0.94	236.1	7.82	95.9
4.	BG – 2076	5.5	0.96	237.2	8.12	96.8
5.	JG 2 – 44	5.4	0.96	238.1	8.17	97.7
6.	GJG – 0408	5.7	0.94	241.2	8.17	98.9
7.	JSC – 48	5.6	0.98	242.6	8.82	99.7
8.	CSJ – 486	5.4	0.97	231.8	8.38	99.8
9.	GJG – 0501	5.8	0.96	233.6	8.08	100.9
10.	PG – 9758 – 6	5.6	0.96	235.1	8.12	98.0
11.	JG – 2 – 25	5.7	0.97	228.2	7.55	98.9
12.	GL - 23094	5.7	0.98	229.6	7.51	99.8

**Table.3** Yield and duration of the varieties

Sl. No.	Variety	Yield (kg ha <sup>-1</sup> )	Duration (Days)	Yield per day (kg)
1.	IPC 2004 - 90	1056	135	7.82
2.	WCG 2000 - 14	620	132	4.70
3.	GPBC - 2	718	130	5.52
4.	BG – 2076	514	132	3.89
5.	JG 2 – 44	787	126	6.25
6.	GJG – 0408	676	130	5.20
7.	JSC – 48	907	124	7.31
8.	CSJ – 486	1009	124	8.14
9.	GJG – 0501	843	125	6.74
10.	PG – 9758 – 6	481	127	3.79
11.	JG – 2 – 25	1088	126	8.63
12.	GL - 23094	1069	130	8.22

**Table.4** Plant Nutrient (%) and Protein Content (%)

Sl. No.	Variety	(%)			Protein (%)
		N	P	K	
1.	IPC 2004 - 90	3.41	0.40	3.2	21.31
2.	WCG 2000 - 14	3.39	0.38	3.4	21.12
3.	GPBC - 2	3.42	0.42	3.1	21.40
4.	BG – 2076	3.40	0.41	2.9	21.25
5.	JG 2 – 44	3.39	0.42	3.0	21.20
6.	GJG – 0408	3.33	0.41	2.9	20.81
7.	JSC – 48	3.39	0.36	3.5	21.20
8.	CSJ – 486	3.36	0.35	3.1	21.00
9.	GJG – 0501	3.34	0.42	3.2	20.88
10.	PG – 9758 – 6	3.35	0.41	2.8	20.93
11.	JG – 2 – 25	3.32	0.40	2.9	20.75
12.	GL - 23094	3.30	0.41	3.4	20.63

**Table.5** Plant nutrient uptake (kg ha<sup>-1</sup>)

Sl. No.	Variety	N	P		K
			kg ha <sup>-1</sup>		
1.	IPC 2004 - 90	36.00	4.22	33.79	
2.	WCG 2000 - 14	21.01	2.36	21.08	
3.	GPBC - 2	24.55	3.02	22.26	
4.	BG – 2076	17.47	2.11	14.91	
5.	JG 2 – 44	26.67	3.31	23.55	
6.	GJG – 0408	22.78	2.78	19.60	
7.	JSC – 48	30.74	3.27	31.75	
8.	CSJ – 486	33.90	3.53	31.28	
9.	GJG – 0501	28.15	3.54	26.98	
10.	PG – 9758 – 6	16.11	1.97	13.47	
11.	JG – 2 – 25	36.12	4.35	31.55	
12.	GL - 23094	35.28	4.38	36.35	

The protein content when analysed showed that the variety GPBC – 2 had the highest (21.40 %) and the lowest was observed in GL – 23094 (20.63 %). In respect to the protein content the variety GPBC – 2 recorded the highest protein content of 21.40 % followed by IPC 2004 – 90 with 21.31 % protein content. So far as plant nutrient uptake (Table 4) is concerned the variety JG – 2 – 25 recorded the highest N and P uptake of 36.12 and 4.38 kg ha<sup>-1</sup> whereas in case of K uptake the variety IPC 2004 – 90 recorded the highest (33.79 kg ha<sup>-1</sup>) these findings are in line with the findings of [Ahmet \*et al.\*, \(2018\)](#). Thus it can be concluded that though chickpea is not a regular crop for Assam looking into the protein content and yield of the different varieties under consideration a few of them *viz* GPBC – 2, IPC 2004 -90, WCG 2000 -14, JG – 2 – 25, CSJ – 486 though less than the national average can be grown easily in Assam, and with better management practices the yield can be increased.

### Future Scope

The chickpea varieties studied above can be utilized for getting new lines that are suitable for Assam and make them popular among the agricultural community as a whole.

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### Author Contributions

A. S. N. Zaman: Investigation, formal analysis, writing—original draft. S. K. P. Zaman: Validation, methodology, writing—reviewing.

### Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

### Declarations

**Ethical Approval** Not applicable.

**Consent to Participate** Not applicable.

**Consent to Publish** Not applicable.

**Conflict of Interest** The authors declare no competing interests.

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