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## Evaluation of pea cultivars (*Pisum sativum* L.) with varying row spacings for high yield production under Imphal valley conditions

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### Abstract

A field experiment was conducted during the rabi season of 2017-18, at the Research Farm, Andro (Imphal), Central Agricultural University, Imphal, Manipur, to evaluate the influence of pea varieties and row spacing on plant growth and yield in the Imphal valley. Two varieties and one Manipur native cultivar, *Makhyatmubi*, were used as main plots, with four row spacings as sub plots (30 cm, 37.5 cm, 50 cm, and 60 cm) carried out in a split plot design with three replications. Pea varieties differed considerably ( $p < 0.05$ ) in terms of plant height, pod length, days to 50% flowering, 100-seed weight, and grain yield. *Makhyatmubi*, a Manipur native cultivar, produced the maximum grain yield. Pea grain yield was considerably higher with closer spacing (30 cm).

**Keywords:** Growth, row spacing, pea, yield, *Makhyatmubi*

### Introduction

The pea (*Pisum sativum* L.) is a cool-season vegetable crop grown worldwide. Pea is a nitrogen-fixing legume that is also high in nutrients, particularly digestible protein. The edible green pod has 7.2% protein, 15.9% carbohydrate, and 0.1% fat. Per 100 g of green edible seed, it contains elements such as potassium (170.0 mg), phosphorus (139.0 mg), calcium (20.0 mg), magnesium (6.0 mg), and iron (1.5 mg). In India, the crop occupies 0.75 million hectares and produces 0.91 million metric tonnes. It is grown on an area of 0.018 million hectares in Manipur, producing 0.017 million metric tonnes of green pods annually. The production of this crop is low due to a lack of information regarding planting time, adequate spacing requirements, and other management methods. Because of its off-season production and high demand for green pods during the lean season, the crop has enormous potential in the state. Currently, a variety of early maturing and high producing vegetable pea varieties have been recommended for the country's plains, but varieties for north east India, particularly the Imphal valley, are few. Manipur grows a variety of peas, each with its own distinct flavor and character. *Makhyatmubi* is one of the most popular native cultivars among them.

The optimal plant spacing is one of the most important agronomic characteristics influencing crop development, performance, and yield. The current experiment was undertaken because little work had been initiated on the native cultivar, *Makhyatmubi*.

### Materials and Methods

The experiment was carried out during the 2017-18 rabi season at Research Farm, Andro, Central Agricultural University, Imphal, which is located between 24°76 North latitude and 94°05 East longitude at a height of 900 meters above mean sea level (MSL) in Manipur's Imphal East district. The soil at the experimental site had the texture of clayey loam, was acidic in soil reaction, high in organic carbon, medium in available nitrogen, low in available phosphorus, and high in available potassium. The climate at the experimental site is subtropical. During the crop growing season, the mean maximum temperature ranged from 4.7 °C to 15.3 °C and the lowest temperature ranged from 20.7 °C to 26.8 °C. Crop received 233.8 mm total rainfall, with 116.3 mm total rainfall occurring solely in December. The experiment was set up in a split plot design, with two pea varieties 'Prakash' and 'Aman' and one local cultivar *Makhyatmubi* as main plots and four row spacings (30 cm, 37.5 cm, 50 cm, and 60 cm) as sub plots. One deep ploughing, two harrowings, and two passes with a land leveller were used to prepare the field. The crop was sowed on December 20<sup>th</sup>, 2017. At sowing, a recommended fertilizer dose of 20:40:20 kg/ha was used.

## Results and Discussion

### Phonological traits of pea

There was no interaction between variety and row spacing; hence, only primary effects are given. A superior genotype may show its potentiality when cultivated under a particular set of agro-climatic conditions, hence it is crucial to assess high yielding genotypes. In the current study, the genotypes differed significantly in terms of key growth metrics such as plant height and number of branches per plant. Variation in these parameters between varieties is primarily attributable to the genetic makeup of the germplasm. *Makhyatmubi*, a local cultivar, produced the longest plant. It was followed by Prakash and Aman, who were roughly equal in decreasing order (Table 1). These disparities in plant height of different types might be related to their genetic contribution and tolerance to prevailing environmental conditions, such as temperature and moisture conditions, which also favored vegetative development (Sirwaiya and Kushwah 2018) [5]. Plant height did not differ considerably among row spacing.

Data on days to 50% flowering and days to 50% podding establish whether a genotype is early or late flowering for selection of variety appropriateness for production. Prakash had the earliest first flower emergence, followed by Aman and *Makhyatmubi*. The number of days necessary for 50% flowering in Prakash was equivalent to Aman. Early maturing varieties take fewer days to flower than other varieties (Khichi *et al.*, 2017) [3], but other factors such as genetic hereditary and favourable climatic conditions such as temperature, rainfall, high relative humidity, and dry sunshine also confirmed that a favourable environment is required for pea flowering (Bairwa *et al.*, 2018) [1]. Kanwar *et al.* (2020) [2] and Sharma *et al.* (2020) [4] both reported comparable findings. Row spacing had no effect on the number of days required for 50% flowering or the number of days to maturity (Table 1).

Different varieties considerably altered the number of days necessary for 50% podding of peas. When compared to all other varieties, variety Prakash had the shortest days of 50% podding. It was followed by Aman and *Makhyatmubi*. The difference in days to physiological maturity may be attributable to genetic characteristics of the particular variety and growing conditions. However, favourable meteorological circumstances and sometimes changes in the microclimate will impact the days necessary for pod establishment and green pod harvesting (Bairwa *et al.*, 2018) [1]. Kanwar *et al.* (2020) [2] and Sharma *et al.* (2020) [4] observed similar findings.

### Yields attributes and yield of pea

Because there was no interaction between variety and row spacing, only the main effects are reported. The number of seeds per pod and the weight of 100 seeds varied significantly between varieties. Variety Aman produced the most pods per plant, but local cultivar *Makhyatmubi* produced the fewest seeds per pod. However, the native cultivar *Makhyatmubi* has the greatest pod length and seed weight.

This could be attributable to genetic differences between the studied varieties. Local cultivar *Makhyatmubi* generated the highest yield, followed by Aman, which could be attributed to *Makhyatmubi*'s larger seed output per plant as a result of longer pod length and 100 seed weight.

Though row spacing had no effect on yield attributes, it was discovered that planting in wider 60 cm spacing resulted in greater yield attributes. However, the closest planting spacing of 30 cm yielded the highest pea yield, while narrower planting spacing resulted in yield loss (Table 2). It could be because there are more plants per unit land, despite the fact that there are fewer pods per plant and fewer seeds per pod. Islam *et al.*, 2002 [6] reported a similar result in pea.

**Table 1:** Pea phonological characteristics as influenced by variety and row spacing

Treatment	Plant height at harvest (cm)	50% flowering (days)	50% podding (days)	Physiological maturity (days)
<b>Variety</b>				
<i>Makhyatmubi</i>	64.52	67.00	79.58	109.58
Prakash	29.53	57.00	75.42	105.42
Aman	26.93	57.67	76.75	106.75
S.Em (±)	3.20	0.19	0.40	0.40
CD (p=0.05)	12.56	0.76	1.57	1.57
<b>Row spacing</b>				
30	38.57	60.56	76.89	106.89
37.5	41.47	60.56	76.67	106.67
50	40.87	60.56	78.56	108.56
60	40.39	60.56	76.89	106.89
S.Em (±)	2.81	0.00	0.71	0.71
CD (p=0.05)	NS	NS	2.11	NS

**Table 2:** Influence of pea variety and spacing on yield parameters and yield

Treatment	No. of branches/plant	No. of pods/plant	No. of seeds/pods	Pod length (cm)	100 seed weight (g)	Seed yield/Plant (g)	Seed yield (kg/ha)
<b>Variety</b>							
<i>Makhyatmubi</i>	5.17	7.92	4.08	6.55	25.02	10.58	937.59
Prakash	5.50	9.08	4.75	5.52	18.21	7.51	664.15
Aman	5.58	8.92	5.50	5.53	17.12	7.59	680.95
S.Em (±)	0.12	0.27	0.27	0.14	0.56	0.49	35.67
CD (p=0.05)	NS	NS	1.058	0.55	2.19	1.91	140.01
<b>Row spacing</b>							
30	5.33	8.44	4.67	5.68	22.08	8.00	983.42
37.5	5.44	8.67	4.33	5.67	17.95	8.57	860.62
50	5.56	9.00	5.22	6.04	19.72	8.53	632.91
60	5.33	8.44	4.89	6.07	20.72	9.14	566.64
S.Em (±)	0.23	0.34	0.27	0.18	1.53	0.48	49.37
CD (p=0.05)	NS	NS	NS	NS	NS	1.44	146.67

### Conclusion

Based on the results of this study, it is possible to conclude that the indigenous cultivar *Makhyatmubi* was superior in terms of pod length and seed weight. As a result, it can be inferred that the native cultivar *Makhyatmubi*, with closer spacing planting of 30 cm, may be used to increase pea productivity in the Imphal valley of Manipur.

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