



# **Influence of Weather Parameters of Growth and Yield Attribute of Different Sowing Date on Different Varieties of Pea Plant**

**Nongthombam Debiya <sup>a\*</sup>**

<sup>a</sup> *Department of Environmental Sciences and Natural Resource Management, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh-211007, India.*

## **Author's contribution**

*The sole author designed, analysed, interpreted and prepared the manuscript.*

## **Article Information**

DOI: 10.9734/IJECC/2022/v12i121527

## **Open Peer Review History:**

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/93665>

**Original Research Article**

**Received: 17/10/2022**

**Accepted: 23/12/2022**

**Published: 23/12/2022**

## **ABSTRACT**

A field experiments was conducted during winter seasons of 2021-22 at Agricultural Research Farm of Sam Higginbottom University of Agriculture Technology and Science, Prayagraj (U.P) "Influence of weather parameters of growth and yield attribute of different sowing date on different varieties of pea plant" Keeping in this view experiment was conducted in Factorial RBD with three replications having two factors with 27 plots. First factor comprised of three dates of sowing (3<sup>RD</sup> Nov. 13<sup>TH</sup> Nov and 23<sup>RD</sup> Nov.) whereas second factor consist of three Field pea varieties SS-10, GS-10, RONALDO-10. Crop sown on 13<sup>th</sup> November was recorded significantly higher yield as compared to 3<sup>rd</sup> November and 23<sup>rd</sup> November. For plant growth parameters of Pea maximum was recorded in 13<sup>th</sup> November as compared to 3<sup>rd</sup> November and 23<sup>rd</sup> November and in case of variety maximum plant height, no of leaves, no of branches grain yield test weight recorded with Ronaldo-10 as compared to GS-10 and SS-10., Vegetative growth, flowering, Pod formation and Maturity and

\*Corresponding author: E-mail: [debiyanongthombam77@gmail.com](mailto:debiyanongthombam77@gmail.com);

stress degree day index was computed. With Ronaldo-10 variety proved the most remunerative and economically feasible for cultivation of Field Pea under the agro climatic conditions of Prayagraj U. P. Growing Degree Days (GDD) or effective heat units or growing degree units are heuristic tool in phenology. It is a simple means of relating plant growth, development and maturity to air temperature.

**Keywords:** *Field pea (Pisum sativum); plant height; number of leaves; number of branches; heat unit; number of pods; growing degree day; heat unit index; photo thermal unit; agro meteorological indices.*

## 1. INTRODUCTION

Pea (*Pisum sativum L.*), Family-Fabaceae is a leguminous, annual herbaceous plant with one – year life cycle. Pea is considered as cool season crop with planting taking place from winter to early summer depending on the location. Seeds may be planted when the soil temperature reaches 10°C, with plants ideally growing at temperatures of 13-18°C. Peas do not thrive in summer heat or lowland tropical climates, but they do grow well in cooler high altitude tropical areas. Best growing temperature are between 55°F and 65°F than other crops. They are cultivated for fresh green seeds, tender green pods, dried seeds and foliage. Green pea consumes as a raw or cooking vegetable separate or mix with potato, cheese, cauliflower and many other vegetables or as a conserved, frozen product, dry seed as food, hay feed for animals and green fertilizer [1]. Edible pea pods include snow peas and sugar snap peas. Some varieties with very small peas are available. Small peas are not necessarily sweeter, tender or better flavoured than larger peas. Pea is grown as vegetable in various states of India. Uttar Pradesh is a major field pea producing state in India producing about 60% of the country's produce [2]. In Uttar Pradesh, Jalaun district contributes highest in terms of area and production by 21% and 29% respectively to the state total area and production of field pea. The other major pea growing states are Bihar, Haryana, Punjab, H.P. Orissa, and Karnataka. Stages of pea plants: young pea plants develop vines, leaves and tendrils in either bush form or vines. We should set up a structural support for taller pea vines. Pea plants that get proper sun exposure and regular water will produce flowers. As petals fall, the bases of the blossom develop into the pea pods. Field pea is an annual, cool season pulse grain and can be of the indeterminate (climbing) type or determinate (bush or dwarf) type. Most cultivars of pea produce white or reddish-purple flowers, which

are self-pollinated. Each flower produces a pod containing four to nine seeds [3].

## 2. MATERIALS AND METHODS

The present investigation on “Influence of Weather Parameters on Growth and Yield Attribution of Different Showing Date on Different Varieties of Pea Plant” was conducted out at the Research farm, of College of Forestry, SHUATS Prayagraj (U.P). The methods employed during the course of investigation and materials utilized have great significance in the research programmes. The experiment was conducted during Rabi season 2021-2022 at Forest Nursery, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj. U.P. which is located at 25°87' N latitude. 81°150' longitude and 98m altitude above the mean sea level.

During winter months especially Dec-Jan temperature drops down to as low as 2.5-4.5°C winter rains are inadequate to cropping. The summer season lasts from April –June with the maximum temperature ranging from 40-45°C. Monsoon begins in early July and lasts till September. The average monthly rainfall, relative humidity, minimum and maximum temperature recorded at Department of Agroforestry and Agro meteorology Observatory Unit, SHUATS.

*Field pea* cultivars namely ss-10, gs-10, Ronaldo-10, peas were sown during rabi season at 10 days' intervals on three dates of sowing beginning 3<sup>rd</sup> November 2021. The field experiment was conducted in a RBD in which three varieties and three sowing dates were replicated three times. Fertilizers were applied as per recommended agronomic package of practices for the experiment i.e. nitrogen @ 20 kg/ha, P<sub>2</sub>O<sub>5</sub> 60 kg/ha and K<sub>2</sub>O 40 kg/ha and 20 kg Sulphur. Seeds were sown at the rate of 6 kg seed per hectare in rows spaced 40 cm, plant to plant 30 cm, apart and 3-4 cm deep by a hand

drawn drill. Weeding was carried out manually at about 40 days after seeding and thinning was done to maintain plant population. The crop was irrigated during the two most critical growth stages viz. flowering and pod formation stages, as per recommended irrigation package of practices for the crop under Prayagraj conditions. The recorded parameters are Germination %, Plant Height for 30, 60 and 90 days, Number of Branches, Total Number of Flowering (100) %, Number of Pods Per Plant, Number of seeds per pods , Grain Yield, Test Weight. The statistical analysis is done through OPSTAT for ANOVA Table. The average monthly rainfall, relative humidity, minimum and maximum temperature recorded at Department of Agroforestry and Agro meteorology Observatory Unit, SHUATS.

### 3. RESULTS AND DISCUSSION

#### 3.1 Effect of Sowing Dates on Germination % of Varieties of Field Pea (*Pisum sativum* L.) at Prayagraj

Table 1 observed that the effects of different date of sowing and varieties on germination percentage were found significant. There is no significant result were observed for the interaction of date of sowing and varieties on germination percentage. The maximum germination percentage (77.00%) of seeds per plot was found in D1V3 and the minimum germination percentage (66.00%) of seeds per plot was found in D3V2. Similarly, the effect of dates of sowing on percentage germination of seeds per plot was found significant. The maximum germination percentage of seeds per plot was recorded in D1V3 (77.00%) and the

minimum germination percentage was found in D3V2 (66.00%).

#### 3.2 Effect of Sowing Dates on Plant Height of Varieties of Field Pea (*Pisum sativum* L.) at Prayagraj for 30, 60, 90 DAS

From the Table 2, it is observed that the effect of showing date on plant height was found significant at 30, 60 and 90. From the table it also shows that the variety has significant effect on plant height from 30 DAS to 90 DAS. The interaction effect of sowing of sowing dates and varieties was found non-significant. The maximum plant height at 30, 60 and 90 DAS is 22.97, 52.83, 107.58 cm was found in D1V3 and the minimum plant height at 30,60, and 90 is 11.51,44.91,92.25 cm was found in D3V2. Similar reports have been reported of Kumar et al. [4] and Sharma et al. [5].

#### 3.3 Effect of Sowing Dates on Number of Branches of Varieties of Field Pea (*Pisum sativum* L.) at Prayagraj

From this Table 3, it may be observed that the effect of sowing date on number of branch was found non significant, the effect of varieties on number of branches was found significant. There were no significant result observed for the interaction of date of sowing and variety on the number of branches. The maximum number of branch (12.94) was recorded in D1V3 and the minimum number of branch (10.22) was found in D3V2.

**Table 1. Effect of different date of sowing and varieties on germination percentage**

Treatment	Mean value		
T1(D1V1)	75.00		
T2(D1V2)	72.33		
T3(D1V3)	77.00		
T4(D2V1)	73.33		
T5(D2V2)	69.66		
T6(D2V3)	75.00		
T7(D3V1)	70.33		
T8(D3V2)	66.00		
T9(D3V3)	71.66		
Factor	SE(d)	CD (p=0.05)	F test
Date	0.205	0.439	S
Variety	0.205	0.439	S

**Table 2. Effect of sowing dates on plant height**

Treatment	30 DAS	60DAS	90 DAS
T1(D1V1)	18.43	51.58	98.04
T2(D1V2)	16.11	47.91	96.08
T3(D1V3)	22.97	52.83	107.58

Treatment		30 DAS	60DAS	90 DAS
T49D2V1)		15.40	48.41	97.48
T5(D2V2))		14.16	45.91	92.41
T6(D2V3)		20.44	49.58	103.03
T7(D3V1)		13.30	46.26	96.34
T8(D3V2)		11.51	44.91	92.25
T9(D3V3)		18.66	47.41	101.68
SE(d)	Date	0.232	0.281	0.387
	Variety	0.232	0.281	0.387
CD(p=0.05)	Date	0.497	0.600	0.828
	Variety	0.497	0.600	0.828
(F-Test)	Date	S	S	S
	Variety	S	S	S

DAS: Days after Sowing

Table 3. Effect of sowing dates on number of branches

Treatment	Mean		
T1(D1V1)	12.48		
T2(D1V2)	10.55		
T3(D1V3)	12.94		
T49D2V1)	12.00		
T5(D2V2))	10.50		
T6(D2V3)	12.64		
T7(D3V1)	11.51		
T8(D3V2)	10.22		
T9(D3V3)	12.51		
Factor	SE(d)	CD (p=0.05)	F- test
Date	0.005	0.010	N/S
Variety	0.005	0.010	S

### 3.4 Effect of Sowing Dates on Number of Flowering (100%) of Varieties of Field Pea (*Pisum sativum* L.) at Prayagraj

Table 4 observed that the effect on date of showing and the varieties on flowering was found significant. The interaction effect of sowing dates and varieties was found significant.

The maximum flowering % (51.42) was found in D1V3 (3<sup>RD</sup> NOVEMBER + RONALDO-10) and the minimum flowering % (46.18) was found in D3V2 (23<sup>RD</sup> NOVEMBER + GS- 10). Similar reports have reported Sharma et al., (2013).

### 3.5 Effect of Sowing Dates on Pods per Plant of Varieties of Field Pea (*Pisum sativum* L.) at Prayagraj

From Table 5 it is observed that the effect of date of sowing and varieties on number of pods per plant was found significant. The interaction effect

of sowing dates and varieties was found significant. The maximum number of pod (35.70) was found in D1V3 and minimum number of pod (29.67) was found in D3V2. Similar reports have been reported Munakamwe et al. (2012), Shaukat et al. (2012) and Tiwari et al. [6].

### 3.6 Effect of Sowing Dates on Number of Seeds per Pods of Varieties of Field Pea (*Pisum sativum* L.) at Prayagraj

From Table 6 it may be observed that the effect of date of sowing and varieties on number of seeds per pods were found significant also the interaction effect of sowing dates and varieties was found significant. The maximum (10.56) seeds was found in D1V3 (3<sup>rd</sup> NOVEMBER+ RONALDO-10) and the minimum (6.78) seeds was found in D3V2 (23<sup>rd</sup> NOVEMBER+GS-10). Similar reports have been reported by Kaya, M., Sanli, A. and Tonguc, M. [7].

Table 4. Effect on date of showing and the varieties on flowering

Treatment	Mean value
T1(D1V1)	50.53
T2(D1V2)	47.50
T3(D1V3)	51.42
T49D2V1)	47.29
T5(D2V2)	46.39
T6(D2V3)	50.70

Treatment	Mean value		
T7(D3V1)	45.19		
T8(D3V2)	46.18		
T9(D3V3)	50.40		
Factor	SE(d)	CD ( $p=0.05$ )	F- test
Date	0.011	0.023	S
Variety	0.011	0.023	S

Table 5. Effect of date of sowing and varieties on number of pods per plant

Treatment	Mean		
T1(D1V1)	30.71		
T2(D1V2)	29.07		
T3(D1V3)	35.70		
T49D2V1)	30.64		
T5(D2V2))	27.58		
T6(D2V3)	34.15		
T7(D3V1)	30.58		
T8(D3V2)	26.76		
T9(D3V3)	31.67		
Factor	SE(d)	CD ( $p=0.05$ )	F- test
Date	0.789	1.687	S
Variety	0.789	1.687	S

Table 6. Effect of date of sowing and varieties on number of seeds per pods

Treatment	Mean		
T1(D1V1)	9.46		
T2(D1V2)	7.46		
T3(D1V3)	10.56		
T49D2V1)	9.43		
T5(D2V2))	7.17		
T6(D2V3)	10.54		
T7(D3V1)	8.55		
T8(D3V2)	6.78		
T9(D3V3)	9.88		
Factor	SE(d)	CD ( $p=0.05$ )	F- test
Date	0.037	0.080	N/S
Variety	0.037	0.080	S

### 3.7 Effect of Sowing Dates on Number of Grain Yield of Varieties of Field Pea (*Pisum sativum* L.) at Prayagraj

From the Table 7 it may be observed that there is no significant relationship due to date of sowing on the number of grain yield. It also observed from the table that the variety has a significant

effect on grain yield. No significant results were sown for the interaction of date of sowing and variety on the grain yield. The maximum grain yield (28.99) was found in D2V3 and the minimum grain yield (22.15) was found in D3V2. Similar report have been reported by Sarkar et al. [8], Sharma [5]; (Surwase and Suryawanshi, 10).

Table 7. Significant relationship due to date of sowing on the number of grain yield

Treatment	Mean		
T1(D1V1)	23.20		
T2(D1V2)	24.64		
T3(D1V3)	28.20		
T49D2V1)	24.51		
T5(D2V2))	23.89		
T6(D2V3)	28.99		
T7(D3V1)	23.24		
T8(D3V2)	22.15		
T9(D3V3)	28		
Factor	SE(d)	CD ( $p=0.05$ )	F- test
Date	0.318	0.679	N/S
Variety	0.318	0.679	S

**Table 8. Effect of sowing dates on test weight**

Treatment	Mean
T1(D1V1)	24.95
T2(D1V2)	23.20
T3(D1V3)	25.98
T4(D2V1)	24.13
T5(D2V2)	23.08
T6(D2V3)	25.95
T7(D3V1)	23.63
T8(D3V2)	22.99
T9(D3V3)	25.97

  

Factor	SE(d)	CD ( $\alpha=0.05$ )	F- test
Date	0.094	0.201	N/S
Variety	0.094	0.201	S

**Table 9. Effect in relationship due to date of sowing on heat unit consumption**

Date of showing	GDD			HTU			PTU		
	V1	V2	V3	V1	V2	V3	V1	V2	V3
1 <sup>st</sup> DOS	1187.6	1187.1	1187.6	6496.17	6444.2	6444.2	15438.8	15550.92	15550.92
2 <sup>nd</sup> DOS	1019.3	1005.9	996.4	5463.44	5361.44	5310.81	13556.67	13378.47	13252.12
3 <sup>rd</sup> DOS	993.2	978.3	949.2	5393.07	5312.16	5125.68	13606.84	13402.71	13004.04

P1= Emergence, P2= Vegetative Development, P3= Flowering, P4= Pod & seed development, P5= Mature

### 3.8 Effect of Sowing Dates on Test Weight (gm.) of Varieties of Field Pea (*Pisum sativum* L.) at Prayagraj

The Table 8 shows that The effect of sowing dates on test weight (gm.) was found non-significant. The effect of varieties on test weight (gm.) was found significant. The interaction effect of sowing dates in varieties was found significant. The maximum (100) seeds test weight (25.98) was found in D1V3 and the minimum (100) seeds test weight (22.99) was found in D3V2. Similar reports have been reported by Biswas et al. (2002).

### 3.9 Meteorological Indices as Influence by Different Dates of Sowing and Varieties

The maximum GDD, HTU, PTU CONSUMED CROP IS 1187.6 (D1V1), 64.96.17 (D1V1), 1550.92 (D1V3) and the minimum gdd htu ptu consumed crop is 949.2 (D3V3), (5125.68) (D3V3), 13004.04 (D3V3). There is significant effect in relationship due to date of sowing on heat unit consumption was also entered from the table that variety has a significant effect on heat unit consumption. The decrease in GDD may be due to decrease in the maturity period of the pearl millet. Similar result found by Murty et al. (2008).

## 4. CONCLUSION

- On the basis of finding of recent research work .it can be concluded that 2<sup>nd</sup> DOS

(13th Nov 2021) was found most suitable period of sowing of field pea which resulted in maximum growth, yield and yield attributes with best use of Agro meteorological indices like GDD, PTU, HTU.

- Among varieties of pea plant, variety 3 (RONALDO-10) proved superior in growth, yield and yield attributes by utilizing the Agro meteorological indices and resources very efficiently.
- The cost benefit ratio are high in T3 DIV3 ( 3<sup>rd</sup> date of sowing and RONALDO-10. Based on their study we can recommended farmers around Prayagraj to prefer used of Ronaldo10 variety and showing of field pea in the 1<sup>st</sup> and 2<sup>nd</sup> week of November for better result and yield. I recommend to the farmer to take the healthy seeds for more and growth and yield.

## COMPETING INTERESTS

Author has declared that no competing interests exist.

## REFERENCES

- Bozoglu HE, Peksen A, Peksen, Gulumser A. Determination of the yield performance and harvesting periods of fifteen pea (*Pisum sativum* L.) varieties sown in autumn and spring. Pak. J. Bot. 2007;39 (6):2017-2025.
- Kumar L, Kumar S, Rathi AS. Effect of different sowing time on pod yield of early

- cultivar of garden pea (*Pisum sativum* L.) var. hortense. *Green Farm*. 2009;2: 915-16.
3. Zohary D, Hopf M. Domestication of plants in the old world: The origin and spread of cultivated plants in West Asia, Europe and the Nile Valley. Third Edition. Oxford University Press Inc. New York Pg; 2002.
  4. Kumar R, Medan S, Yunus H. Effect of planting dates on yield and quality in durum varieties of wheat. *Haryana Agric. Univ. J. Res.* 1994;24: 186-188.
  5. Sharma Brij Bihari, Sharma, Vinod Kumar, Dhakar Mahesh Kumar, Punetha Shailaja. Combining ability and gene action studies for horticultural traits in garden pea: A review. *Afr. J. Agric. Res.* 2013;8(35): 4718- 4725.
  6. Tiwari Rajni, Bhatt Lalit, Dev Rahul. Effect of date of sowing on growth and yield of vegetable pea genotypes under rain-fed mid-hill conditions of Uttarakhand. *Indian J. Hort.* 2014;71(2):288-291.
  7. Kaya M, Sanli A, Tonguc M. Effect of sowing dates and seed treatments on yield, some yield parameters and protein content of chickpea. *African J. Biotech.* 2010;9:3833-39.
  8. Sarkar M, Sharma RA, Deshmukh PS. Physiological studies on pod and seed characters in relation to productivity in garden pea. *Ann. Agric. Res. New Series.* 2003;24:289-93.

---

© 2022 Debiya; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

*The peer review history for this paper can be accessed here:*  
<https://www.sdiarticle5.com/review-history/93665>