



# Impact of sowing depth on emergence and seedling height of common bean (*Phaseolus vulgaris* L.) at Kumaon region of Uttarakhand

Jitesh Singh Bisht<sup>1</sup>, Parshvi Joshi<sup>2</sup>, Sunil Kumar<sup>3</sup> and Sachchida Nand Singh<sup>4</sup>

College of Agriculture Sciences, Teerthanker Mahaveer University, Moradabad U.P

Corresponding Author: [schchida@gmail.com](mailto:schchida@gmail.com)

<https://doie.org/10.0620/AE.2024259225>

## ABSTRACT

*This research was carried out to elaborate the effects of sowing depth of bean seeds on emergence period of the seedling and height of the seedling. The variety chosen for the study was Anupama, which is a dwarf one, around 2 feet tall & bushy in morphology. The experiment was conducted at Kumaon region of Uttarakhand, India during summer season, 2023. The trial was conducted on pots with four treatments of different depths i.e., 1cm, 2cm, 3cm & 4cm & each treatment was having four replications. During the experiment, emergence period and seedling height are studied & data was collected. The result showed that, least time was taken by seeds sown at 1 cm depth while other seeds took 6 to 8 days for emergence, talking about seedling height 1 cm seeds have 6 cm height while others have 5 cm of height and shallow seeds were having thin stems while deeper seeds show slight less height but thicker stem. Thus, experiment showed that slight deeper depth is suitable for French bean i.e. 4 cm.*

**Keywords:** Beans, Sowing Depth, Emergence, Growth Parameters & Hills

## INTRODUCTION

French bean, scientifically termed *Phaseolus vulgaris* L., is a member of the legume family, Leguminaceae. This versatile crop serves both as a staple food and a popular vegetable. When dried, these are consumed as legumes, providing a nutritious source of protein, fiber, and various vitamins and minerals. However, they are equally prized for their young, tender pods, which are harvested before maturity and used as a vegetable. The young pods of French beans are crunchy and have a gentle, slightly sweet taste, because of this, they're really popular in cooking all over the world. They are cooked in various ways,

including steaming, boiling, stir-frying, or adding to salads and soups. French beans are great for eating because you can use them either fresh or dried. They're enjoyed by people all over the world because they add both nutrition and delicious taste to meals. (V. P. Santhi *et al.*, 2015)

French beans are also known as snap beans, green beans, kidney beans, and haricot beans. These are different names for the same type of bean. They're called different names depending on how they're prepared or where they're grown. (George *et al.*, 1985). The primary center of origin is Southern Mexico and Central America while Peruvian Ecuadorian- Bolivian

Area is the secondary center of origin (Hema *et al.*, 2020). Common beans are self-pollinated plants and provide pods as vegetables, also the foliage of the crop is used as a silage and green manure. The Anupama variety bears pods which are shinning green, fibreless, and curved at the bottom. This is a bush type and does not require support. Seeds for the experiment were purchased from a local market and was produced by North East Seeds.

In India, French bean are cultivated in Maharashtra, Jammu & Kashmir, Himachal Pradesh, and Uttar Pradesh Hills, Nilgiri (Tamil Nadu) & Palni (Kerala) hills, Chickmagalur (Karnataka) & Darjeeling hills of West Bengal. (Indian Institute of Horticultural Research)The experiment was conducted at Almora, Uttarakhand India, during summer season, June 2023. It is located at 29.5971°N 79.6591°E in Uttarakhand. Location is situated 415 km south-east of the state capital Dehradun. It has an average elevation of 1,604 m (5,262 ft) above mean sea level. The climate of Almora is characterized by relatively high temperatures and evenly distributed precipitation throughout the year. The average annual temperature is 23.5 °C or 74.3 °F. French beans are grown in the Terai region of Nepal during winter, but their popularity is increasing in the high hills, where they're cultivated during summer. Because of their high market demand and value, farmers are now planting them in different seasons and regions, expanding their cultivation beyond traditional areas. (Pokhrel *et al.*, 2022) For seeds to germinate and for seedling health, the depth at which they are planted is essential. If seeds are

planted too shallow, they might not get enough moisture from the soil, leading to weak sprouting, or they could be damaged by pests or diseases. On the other hand, if seeds are planted too deep, they might take longer to sprout because the soil is colder, or they might not sprout at all, causing poor growth or damage to the seeds. Therefore, finding the right planting depth is essential for successful germination and healthy seedling growth. (Sumit Sharma *et al.*, 2015). Due to lack of awareness about the sowing depths of the bean seeds, farmers are facing problem of low emergence & weak seedlings.

This study aimed to figure out how different planting depths affect the emergence and height of French bean seedlings. By doing this, we hope to find the best depth for planting French beans. If we know the ideal depth, farmers can avoid losing crops because of planting them too shallow or too deep. It's important because planting them too shallow might mean they don't grow properly, while planting them too deep could also cause problems. By getting the depth just right, we can help farmers grow healthier French bean plants and avoid wasting seeds and time. This information can lead to better yields and more successful harvests, benefiting both farmers and consumers who rely on French beans for food.

## **MATERIALS & METHODS**

### ***Experimental setup (Pots)***

We have four treatments of different depths i.e., 1cm, 2cm, 3cm, & 4cm. Every treatment has 4 replications. The seeds were sown on pots of 20 cm in height.

### **Experimental procedures**

Seed were soaked in water for 3 hrs & accurate depth of seeding was accomplished by use of wooden boards, 10 cm in length, where the thickness matches the planting depth. Seeds were pressed gently into the soil to their respective depths.

### **Potting mixture & nutrients**

The potting mixture was sandy loam and pH is around 6. One half of the pot is filled with soil and other half of the pot is filled by mixture of soil and FYM in a ratio 60:40 respectively. The fertilizers used during the study were totally organic, which are made by vegetable and fruit wastes. For phosphorus onion peels extracts, for potassium banana extracts and for nitrogen tea leaves are used.

### **Data collection**

During the experiment, data for emergence period and seedling height were recorded. In this experiment, seeds were considered germinated when the first shoot emerged from the soil. We kept track of germination until all seeds either sprouted or were determined to be dead. This method helped us monitor the progress of seed growth accurately throughout the experiment. By observing germination counts until completion, we gained insights into the overall success rate of seed germination, which is crucial for understanding the effectiveness of different planting conditions. (Siddig A *et al.*, 2015). The labelling of the samples is as follows:

Label	Seed Depth
S1	1 cm
S2	2 cm
S3	3 cm
S4	4 cm

## **RESULTS & DISCUSSIONS**

### **Emergence period**

This period refers to the time it takes for the seedlings to break through the soil surface and become visible above the ground. We observed that least time was taken by seeds sown at 1 cm i.e., S1. Seeds at this depth took 5 days for emergence. While seeds at other depths i.e., 2 cm, 3 cm & 4 cm,

took 6 to 8 days for emergence. Three seeds were emerged at 2 cm depth while all the seeds were emerged which were sown at the depth 3 cm & 4 cm. However, effect of sowing depth did not significantly influence the seedling emergence (Raju Thiyam *et al.*, 2017).

### **Seedling height**

Calculating seedling height typically involves measuring the length of the main shoot or stem from the point where it emerges from the soil (cotyledons or first true leaves) to the tip of the growing point or terminal bud. Proper understanding of the relationship between planting depth and seedling height is essential for optimizing crop production and ensuring healthy plant establishment. When seeds are planted too shallow, they may face challenges in accessing sufficient moisture and nutrients from the soil. As a result, seedlings may exhibit stunted growth and reduced overall height. Planting seeds at an appropriate depth ensures that they have access to essential resources while being protected from extreme environmental stressors. When planted at the optimal depth, seedlings tend to demonstrate steady growth and achieve healthier heights. Deep planting may restrict the seedlings' ability to emerge from the soil surface efficiently.

In such cases, seedlings might exert more energy to reach the surface, leading to weakened growth and reduced height. Seedlings from group S1 measured 6 cm in height, slightly taller than those from other groups, which averaged 5 cm. Although the difference is minimal, it's noteworthy that S1 seedlings appeared thinner compared to those from groups S3

and S4. While height variation is slight, the observation of thinner seedlings suggests potential differences in stem development or growth patterns among the groups. This finding underscores the importance of considering not only height but also other characteristics, such as stem thickness, when evaluating seedling growth.

### CONCLUSION

The study focused on seedling emergence and height in relation to planting depth. Seeds planted at 1 cm depth emerged the fastest, within 5 days, while those at greater depths (2 cm, 3 cm, 4 cm) took 6 to 8 days. Despite varied emergence times, planting depth didn't significantly influence overall emergence rates. However, shallow planting can potentially hinder nutrient uptake, leading to thinner stem. Optimal planting depth is crucial for ensuring seedlings access essential resources while mitigating environmental stress. Interestingly, seedlings from the 1 cm depth (S1) exhibited comparable heights (6 cm) to those from deeper depths (5 cm), suggesting resilience despite differences in thickness. This finding underscores the importance of considering both emergence time and seedling characteristics when optimizing planting practices for healthy crop production. Further research could explore the mechanisms underlying seedling development across different planting depths to refine cultivation techniques.



**1 cm**



**3 cm**



**2 cm**



**4cm**



## REFERENCES

- Anil Pokhrel and Sangharsh Raj Dangi. 2022.** Increasing the productivity of rajma through proper sowing date and plant geometry. *Journal of Agriculture and Natural Resources*, 5(1): 12-18
- George RAT. 1985.** Vegetable Seed Production. *Longman & New York*, pp: 193-207
- Hema and D.K. Rana. 2020.** Evaluation of French Bean (*Phaseolus vulgaris* L.) Genotypes for Growth, Pod Yield and Quality under Sub-Tropical Condition of Garhwal Hills. *International Journal of Current Microbiology and Applied Sciences*, 9(7):974- 980
- Raju Thiyam, B Yadav and PK Rai. 2017.** Effect of seed size and sowing depth on seedling emergence and seed yield of pea (*Pisum sativum*). *Journal of Pharmacognosy and Phytochemistry*, 6(4): 1003-1005
- Siddig A. M. Ali, Abdellatif Y. Idris. 2015.** Effect of Seed Size and Sowing Depth on Germination and Some Growth Parameters of Faba Bean (*Vicia faba* L.). *Agricultural and Biological Sciences Journal*, 1(1): 1-5
- Sumit Sharma, Jason Warren, Josh Lofton, Wilson Henry, Cameron Murley. 2019.** Optimum Planting Depth for Uniform Germination and Emergence of Corn. *Oklahoma State University*
- V. P. Santhi, P. Raja, B. Anita and N. Selvaraj. 2015.** Evaluation of French beans (*Phaseolus vulgaris* L.) bush type at mid and higher elevations of Nilgiris. *The Asian Journal of Horticulture*, 10(1): 100-104

\*\*\*\*\*