

Research  
Paper

## Dry matter accumulation, pod and seed yield of French bean as influenced by different dates of sowing and varieties during *Kharif*

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### ABSTRACT

A field experiment was conducted during *Kharif* season 2005-06 to study the dry matter accumulation pattern, pod and seed yield (kg/ha) of French bean varieties influenced by different dates of sowing *i.e.* 10 day interval after first sowing on onset of monsoon. Early sowing on 13<sup>th</sup> July was found sufficient for increased dry matter in various plant part of French bean as compared to delayed sowing *i.e.* 22<sup>nd</sup> July, 3<sup>rd</sup> and 12<sup>th</sup> August and variety 'Arka Komal' produced maximum dry matter accumulation of leaf and stem as compared to varieties Varun, Contender and Waghya. Variety 'Varun' produced maximum total dry matter (g/plant), pod and seed yield (kg/ha) as compared to Contender, Arka Komal and Waghya.

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**KEY WORDS :** Sowing dates, Varieties, Dry matter accumulation, Yield attributes, Pod and seed yield, French bean

French bean is grown in different part of the world for its mature dry beans, immature tender green pods and for its leaves to be used as vegetable and dry seed as pulse. Although some high yielding varieties have been developed in French bean, non-availability of quality seeds is one of the factors hindering productivity of crop. Optimum sowing dates is also most important factor for successful production of any seed crop. Sowing dates and plant varieties are the most critical factors for achieving higher productivity. Hence, the present experiment was undertaken to study the dry matter accumulation and pod and seed yield of French bean as influenced by different dates of sowing and varieties during *Kharif* season 2005-06 under Marathwada condition.

### RESEARCH PROCEDURE

The present investigation was undertaken at Marathwada Agricultural University, Parbhani, during *Kharif* season 2005-06 to study the dry matter accumulation pattern, pod and seed yield (kg/ha) of French bean as influenced by different sowing dates and varieties. The materials for this study were taken from the experiments conducted with a view for studying the response of French bean varieties to different sowing dates during *Kharif* season 2005-06. The experiment was laid

out in split plot design with 16 treatment combinations comprising of four sowing dates *viz.*, 10 days interval after first sowing dates on onset of monsoon *i.e.* M<sup>1</sup>- onset of monsoon(13<sup>th</sup> July), M<sup>2</sup>-10 days after first sowing(22<sup>nd</sup> July), M<sup>3</sup>- 20 days after first sowing (03<sup>rd</sup> August), M<sup>4</sup>- 30 days after first sowing(12<sup>th</sup> August) as main plot and four varieties *i.e.* V<sup>1</sup>- Varun, V<sup>2</sup>-Waghya, V<sup>3</sup>- Arka komal, and V<sup>4</sup>- Contender as subplot.

The investigation was carried out on medium deep vertisol. The soil of the experimental plot was clayey in texture, with slightly alkaline in reaction (pH=7.86). It was low in available nitrogen (210kg/ha) medium in phosphorus (22.77kg/ha) and fairly rich in available potassium (378kg/ha). Each experimental unit was replicated thrice with 4.5M x 3.6M and 3.6M x 2.7M size in gross and net plot, respectively. The four varieties were sown as per the treatment of sowing dates by dibbling method. First sowing was done onset of monsoon *i.e.* 13<sup>th</sup> July. The half dose of N(60kg) and full dose of P (60kg) and K(60kg) was applied as basal and remaining half N(60kg) was applied 30 days after sowing.

For the purpose of recording growth and yield observation, each plot was divided into sub plot, five plants were randomly selected and tagged for recording plant height and yield components, five plants were uprooted at

random from each plot and separated into leaf, stem and reproductive parts for dry matter studies at various stages and collected in properly labeled paper bags for drying. The samples so collected were air dried for 3 to 4 days and subsequently oven dried at the temperature 65°C for 48 hours. The oven dried samples showing constant weight of leaves, stem, pods from each plot were weighed and recorded.

## RESEARCH ANALYSIS AND REASONING

The data recorded during the course of investigation were tabulated, statistically analysed and results are interpreted here under appropriate heads:

### Dry matter production, pod and seed yield:

#### *Effect of sowing dates:*

Dates of sowing and varieties significantly influenced the total dry matter production, pod and seed yield (kg/ha) at harvest (Table 1). The crops sown on 13<sup>th</sup> July and 22<sup>nd</sup> July recorded significantly highest total dry matter production, pod and seed yield (kg/ha) during *Kharif* season. The total dry matter production was slow initially up to 45 DAS and become fast during 46 to 75 DAS due to grand growth of crop with maximum number of leaves, branches and pods during this period. Early sowing date 13<sup>rd</sup> July recorded more dry matter accumulation, pod and seed yield (kg/ha) and there was significant reduction in total dry matter (g/plant) at delayed sowing dates *i.e.* 22<sup>nd</sup> July, 03<sup>rd</sup> August and 12<sup>th</sup> August of French bean crop. Variation in the dry matter accumulation was due to variation in minimum temperature during pod-filling phase.

The dry matter accumulation of leaf (g/plant) increased rapidly up to 60 DAS and gradually decreased thereafter

till maturity due to leaf senescence. Sowing date 13<sup>th</sup> July produced maximum leaf dry matter (g/plant) than 22<sup>nd</sup> July, 03<sup>rd</sup> July and 12<sup>th</sup> August sowing dates.

The dry matter accumulation of stem (g) per plant increased rapidly up to 75 DAS and remained constant at harvest. Sowing date 13<sup>th</sup> July produced maximum stem dry matter (g/plant) than 22<sup>nd</sup> July, 03<sup>rd</sup> and 12<sup>th</sup> August sowing.

Mean dry matter of pod (g) per plant was increased progressively up to harvest. The rate of dry matter accumulation of pods per plant was faster during 60 to 75 DAS. Early sowing date 13<sup>th</sup> July produced maximum dry matter of pods (g) over delayed sowing. Sowing date 12<sup>th</sup> August recorded least pod dry matter (g) per plant.

Sowing date had profound effect on pod, and seed yield (kg/ha). Sowing date 13<sup>th</sup> July and 22<sup>nd</sup> July recorded highest pod and seed yield (kg/ha).

As compared to rest of sowing dates. There was reduction in seed and pod yield when sowing was delayed than 13<sup>rd</sup> July or 22<sup>nd</sup> July. Lowest pod and seed yield (kg/ha) was recorded in 12<sup>th</sup> August sowing. Sowing date 13<sup>rd</sup> July favoured the seed, pod yield due to favourable weather condition for partitioning of dry matter in reproductive parts, which was reflected through higher value of harvest index at 13<sup>rd</sup> July sowing. The highest seed yield from 13<sup>rd</sup> July was apparently due to lower temperature during the plant growth which might have favoured better photosynthetic activity which reflected in better yield attributes. Similar results were reported by Tetenyi and Szejtli (1980), Chagas *et al.* (1982), Anonymous (1984, 1988a, 1988b), Reghuvanshi *et al.* (1998), Phagat and Singh (1989a), Bhardwaj *et al.* (1994) and Vishwanath *et al.* (2004).

**Table 1 : Total dry matter production and its accumulation in leaf, stem, pod and pod yield and seed yield (kg/ha) as influenced by different dates of sowing and varieties of French bean during *Kharif***

Treatments	Total dry matter (g/plant)	Leaf dry matter (g/plant)	Stem dry matter (g/plant)	Pod dry matter (g/plant)	Pod yield (kg/ha)	Seed yield (kg/ha)
<b>Sowing dates</b>						
M <sup>1</sup>	12.73	1.42	2.13	9.19	1090	722
M <sup>2</sup>	10.99	1.15	1.94	7.90	1062	698
M <sup>3</sup>	06.24	0.93	1.69	3.61	517	331
M <sup>4</sup>	05.24	0.84	1.66	3.14	425	242
CD	00.39	0.005	0.07	0.76	50	30
<b>Varieties</b>						
V <sup>1</sup>	10.56	1.11	1.89	7.56	1245	820
V <sup>2</sup>	7.86	0.91	1.54	5.42	596	365
V <sup>3</sup>	8.65	1.25	2.15	5.24	624	397
V <sup>4</sup>	8.52	1.07	1.83	5.62	630	411
CD	0.78	0.05	0.21	0.66	100	93

*Varieties:*

Increase in dry matter was the cumulative effect of increase in various growth characters like plant height, number of leaves per plant, number of pods per plant, and increase in dry matter accumulation per plant was affected by different varieties. Variety Arka Komal produced maximum dry matter accumulations of leaf and stem as compared to variety Varun which produced maximum pod, total dry matter as compared to Contender, Arka komal and Waghya. Varieties had profound effect on pod and seed yield (kg/ha). Variety ‘Varun’ recorded highest pod and seed yield than other varieties. Varieties Contender, Arka Komal and Waghya were at par with each other. Variety Waghya recorded lowest pod and seed yield (kg/ha).

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