

ARTICLE

Early planting dates and their influence on yield of faba bean varieties (*Vicia faba* L.)

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ABSTRACT

The field experiment that was conducted in 2025-2026 winter was conducted on the land of the farmer situated 5 km northwards of the center of Al-Muthanna Governorate, where the latitude was 45.27° W and the longitude 31.38° N. By conducting the experiment, it was established that the planting period that is selected early (September 15, October 1, and October 15) is essential for the yield of four faba bean varieties (Luz de Otono, Rama, Aguadulce and Aquadlge). The block design was completely randomised with a split-plot layout, where the main plots were for planting dates and the subplots for varieties, with replications of three. Based on the results, the third date had (10/15) the highest median values of all three plots, with the highest average counts of pods (15.34 per plant), number of seeds (4.69 seeds per pod), green pod Yield (39.56 tonnes per hectare), total seed yield (4.99 tonnes per hectare). According to the results of the results, some types of broad bean have the highest mean yield of green pods (44.01 tonnes ha¹) and total seed yield (5.03 tonnes ha¹) which was obtained and have been used. The Aquadlge variety, in contrast, had the highest mean number of seeds per pod produced (4.77 seeds per pod). These planting dates and varieties had an impact on the overall production, as observed by the highest average for pod counts/plant and green pod yields of 15.70 per plant and 48.30 tonnes/ha with the combination of the 3rd date and Aguadulce.

Keywords: Faba bean; Varieties; Dates; Yield.

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Citation: AL-Shanbri, S. S. F., & Alhasany, A. R. (2026). Early planting dates and their influence on yield of faba bean varieties (*Vicia faba* L.). *Misan Journal of Agricultural and Environmental Sciences*, 26(3), 40–46. <https://doi.org/10.64333/MJAE.26.3.5>

Received: 06/08/2026

Accepted: 30/08/2026

Published: 30/09/2026

DOI: <https://doi.org/10.64333/MJAE.26.3.5>

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INTRODUCTION

The broad bean (*Vicia faba* L.) is classified as one of the major legume winter crops and is a food for many people worldwide due to its high protein content of 20-26% (Torabian *et al.*, 2026). It is grown to produce dry and soft seeds or green pods with particular regard to low-income countries. This crop is known to improve soil fertility through root nodules to fix nitrogen, in cooperation with Rhizobium bacteria, reducing chemical fertiliser dependency. It is also integrated into crop rotation (AL-Hamdani and Al-Juboori, 2026). Planting dates were found important in shaping the crop growth phases during various stages of plant growth, particularly flowering, determining crop productivity, as they directly affect the different growth stages. Unfavorable environmental conditions, particularly fluctuations in temperature during the various growth stages, can significantly affect yield and its components. Exposure of plants to low or high temperatures, especially during critical growth stages such as flowering, pollination, pod formation, and seed filling, can lead to a reduction in productivity by affecting the number of pods, seed weight, and total yield (Gomaa *et al.*, 2023).

Knowing the accumulated heat units is fundamental to identify key growth stages, that impact on when plants should be planted, determining the appropriate planting date represents an important means of improving the synchronization of the crop's physiological stages with the prevailing environmental conditions during the growing season (Lundby *et al.*, 2024). Each crop possesses a designated growth temperature, which is regulated by timely planting. The optimal planting date is an essential factor in crop management because it determines the supply-demand relationship that in turn impacts the final crop yield (Alharbi and Adhikari, 2020). Selecting types suitable for the present environmental conditions becomes a useful way to improve the efficiency of production. The genetic composition of varieties gives rise to differences in physiological processes. Thence encompassing length of the growth period, time to flowerin, and their ability to tolerate low or high temperatures. They also differ in their ability to maintain pod formation and seed filling under un-favorable environmental conditions due to their genetic makeup. Therefore choosing plant varieties adapted to environmental conditions is a serious concern for plant breeders (Hammad *et al.*, 2018). In light of global climate change and the accompanying rise in temperatures due to global warming, the need has arisen to re-evaluate many agricultural practices, including planting dates, given their important role in improving crop growth and productivity. We aim to evaluate the effect of early planting dates on overall faba bean yield.

MATERIALS AND METHODS

The experiment took place in the winter season of 2025-2026 on the agricultural land 5 km north of the centre of Al-Muthanna Governorate, latitude 45.27 ° W and longitude 31.38 ° N. The purpose of the experiment was to evaluate the effect of early planting dates (15 September, 1 October, and 15 October) on the yield of four broad bean types (Luz de Otono/ Spain, Rama/ Spain, Aguadulce/ New Zealand, and Aquadlge /Turkiye). A split plot design with three replications was the method of experiment. The main plots involved the planting dates, but the subplots included the cultivars which yielded 36 experimental units. Each experimental unit encompassed (3* 2.5) 7.5 m², with five rows separated by 55 cm, with a 25 cm interval between rows and hills. The plant density must be 72727.27 plants per hectare (Al-Khafaji *et al.*, 2026). A sample was randomly collected from the experimental field at a depth of 0-30 cm prior to planting. The mixture was subsequently dried and sieved through a 2 mm mesh to acquire a composite sample typical of the experimental field. Physical and chemical analyses were conducted on this sample as outlined in Table 1.

Table (1) Physical and chemical properties of the experimental field soil.

Attributes	Value	Unit
pH	7.54	
Ec (1:1)	2.3	Ds m ¹
Available N	21.6	mg kg ⁻¹ soil
Available P	15.31	mg kg ⁻¹ soil
Available K	199.23	mg kg ⁻¹ soil
Soil separations (Silt Loam)		
Clay	20.44	%
Silt	64.56	%
Sand	15	%

Four seeds were initially sown in each hole, subsequently thinned to one plant per hole. Fertilization was conducted utilizing urea (46% N) as the nitrogen source, adhering to the advised rate of 80 kg N ha⁻¹. This was implemented in two applications: the first occurred one month post-planting, followed by the second one month following the first, sequentially for each application.

Phosphate fertilization was conducted at the advised rate of 80 kg P ha⁻¹ using monophosphate (18% P), applied in a single application prior to planting. Potassium fertilization was conducted at a rate of 80 kg K utilizing potassium sulphate (62% K) (Al-Abidi, 2011). Crop management activities, such as irrigation and weeding, were conducted as required, and the crops were harvested for each season and variety upon achieving full maturity starting from 3/ 5.

Studied Characteristics:

- 1- Number of pods per plant: Calculated as the average of ten plants randomly selected at full maturity.
- 2- Number of seeds per pod: Calculated as the average of twenty-five pods from the ten plants. The number of seeds in each pod was calculated.
- 3- Weight of 100 seeds: Measured after randomly selecting 100 seeds at the dry stage.
- 4- Green pod yield: Measured on the five plants selected for the study by calculating the average cumulative yield of the three harvests at market maturity. This was then multiplied by the plant density and converted to tons per hectare.
- 5- Total seed yield: Calculated as the average of ten plants randomly selected and measured after the seeds had dried appropriately.

The results were statistically analyzed according to the experimental design using GenStat software at a significance level of 0.05.

Table (2) The metrological data during growing season of 2025/2026.

Months	Days	Temperatures		Thermal Accumulation	Relative Humidity
		Maximum	Minimum		
September	15-30	40.4	24	32.2	21.27%
October	1-15	32.73	18	25.37	29.27%
	16-31	28.81	14.88	21.84	37.44%
November	1-15	27.73	11.47	19.6	45.27%
	16-30	19.73	8.93	14.33	52.73%
December	1-15	16.4	6.27	11.34	58.93%
	16-31	14.07	4.00	9.04	59.75%
January	1-15	13.33	3.33	8.33	64.8%
	16-31	15.06	5.69	10.38	53.13%
February	1-15	20.07	9.43	14.75	47.64%
	16-28	23.14	11.71	17.43	41%
March	1-15	27.53	15.07	21.3	33.8%
	16-31	29.31	16.56	22.94	27.88%

The climatic data were obtained from (NASA POWER) based on the geographical coordinates of the experimental site.

RESULTS AND DISCUSSION

Number of pods per plant (pod per plant⁻¹)

The statistical analysis results in Table (3) indicated a substantial difference in the early planting dates of Varieties and their interaction for the feature of pod count per plant.

Table (3) demonstrated a considerable impact of early planting dates on the trait of pod quantity per plant. The third planting date (October 15) gave a maximum average for the characteristic of 15.34 pods per plant, while the first planting date (September 15) showed a minimum average of 11.52 pods per plant. This may be attributed to more favorable climatic conditions, particularly the prevailing temperature and extended photoperiod, which promoted rapid plant growth and enhanced dry matter accumulation (Mahdy and Ahmed, 2018). This result agrees with the findings of (Fakhr *et al.*, 2020 and El-Haggan *et al.*, 2025).

Table (3) illustrates that the types had a considerable impact on the number of pods per plant. The Aguadulce

variety produced the highest average of 14.60 pods per plant, whilst the Rama variety yielded the lowest average of 11.03 pods per plant. The excellence of the Aguadulce variant can be ascribed to the genetic differences among the varieties. The aforementioned outcomes are congruent with those specified by [AL-Saedy et al. \(2024\)](#) and [Alatawi et al. \(2024\)](#).

The interaction significantly affected the trait of pod count per plant, with the combinations (third date × Aguadulce) and (third date × Luz de Otono) yielding the highest average of 15.70 pods per plant, in contrast to the combination (second date × Rama), which produced the lowest average of 8.75 pods per plant.

Table (3) The effect of early planting dates, varieties and the interaction between them on the number of pods per plant (plant pod⁻¹)

Dates	Varieties				Means
	Luz de otono	Rama	Aguadulce	Aquadlge	
15/9	9.47	8.93	14.71	12.99	11.52
1/10	12.91	8.75	13.38	15.69	12.68
15/10	15.70	15.40	15.70	14.55	15.34
Means varieties	12.69	11.03	14.60	14.41	
L.S.D _(0.05)	Dates=2.75 Varieties=2.00 Interaction= 3.63				

Number of seeds per pod (pod seed⁻¹)

Table (4) shows that there are significant differences in early planting dates and varieties, while the interaction between them did not have any significant effect on this trait.

Table (4) indicates that early planting dates considerably influenced the seed count per pod. October 15th yielded the greatest average for this characteristic, with 4.69 pod seeds per pod. The results were not markedly distinct from the second planting date, which yielded an average of 4.55 seeds per pod, in contrast to the September 15th date, which produced the lowest average for this characteristic, at 4.23 seeds per pod. The advantage of the third planting date can be ascribed to its optimal planting conditions, resulting in a greater accumulation of heat units from planting to maturity. As a result, there was an augmentation in the flow of processed materials from the source to the outlet, positively impacting the quantity of seeds per pod ([Al-Fartosi and Abd-ElWahed, 2023](#)). This aligns with the findings of [Mostafa et al. \(2021\)](#).

The findings indicated a substantial impact of variations on the seed count per pod. The Aquadlge variety had the greatest average for this feature, yielding 4.77 seeds per pod, and did not substantially differ from the Luz de Otono variety, which averaged 4.62 seeds per pod, in contrast to the Rama variety, which recorded the lowest average at 4.27 seeds per pod. This may be ascribed to the variation in the genetic composition of the types examined in the study. This aligns with the findings of [Attia, \(2023\)](#) and [Raheem et al. \(2024\)](#).

Table (4) The effect of early planting dates, varieties and the interaction between them on the number of seeds per pod (pod seed⁻¹)

Dates	Varieties				Means
	Luz de otono	Rama	Aguadulce	Aquadlge	
15/9	4.33	4.42	3.90	4.26	4.23
1/10	4.72	3.98	4.42	5.08	4.55
15/10	4.82	4.42	4.54	4.97	4.69
Means varieties	4.62	4.27	4.29	4.77	
L.S.D _(0.05)	Dates= 0.24 Varieties= 0.40 Interaction= N.S				

Weight of 100 seeds (g)

The statistical analysis results in Table (5) indicated substantial variations in variety, although early planting dates had no significant impact on the 100-seed weight characteristic. The data in Table (5) indicated that varieties had a considerable impact on this feature. The Aguadulce variety yielded the highest average weight of 134.80 g, whereas the Rama variety produced the lowest average weight of 114.00 g. This may result from the genetic The variation in composition among the different varieties may be attributed to their differing capacities to accumulate and transport dry matter to the estuary. This aligns with the findings of [Al-Wagaa et al. \(2025\)](#) and [Alqader et al. \(2020\)](#). The interaction notably influenced the 100-seed weight attribute, with the combination of the second date and Aguadulce yielding the highest average of 141.70 g, in contrast to the first date and Rama combination, which produced the lowest average of 96.10 g for this feature.

Table (5) Effects of the early planting dates, varieties and the interaction between the dates, varieties and the weights of 100 seeds

Dates	Varieties				Means
	Luz de otono	Rama	Aguadulce	Aquadlge	
15/9	114.10	96.10	132.40	113.90	114.10
1/10	119.20	124.30	141.70	135.80	130.20
15/10	128.10	121.50	130.30	126.90	126.70
Means varieties	120.50	114.00	134.80	125.50	
L.S.D _(0.05)	Dates= N.S Varieties= 7.29 Interaction=18.74				

Green Pod Yield (ton ha⁻¹)

Statistical analysis of data showing significant variation in the production of green pods is reported showing the effect of early planting dates and cultivars together with the interactions. Green pod production based on Table (6) we can see that the planting dates have a significant influence on the green pod yield. As for the third planting date (October 15), which averaged the highest yield by far, was 39.56 tonnes ha⁻¹, while the first planting date had minimum average yield at 29.27 tonnes ha⁻¹. We can see that the increased green pod production at the third planting date is a product of a higher number of pods per plant (Table 3) and seeds per pod (Table 4), which, in turn, results in high green pod yield. This finding corroborates with [Al-Shakarchy, \(2021\)](#). It can be seen from Table (6) that the variety differences that contributed a lot to this were pronounced since the Aguadulce variety had a mean of 44.01 (tonne ha⁻¹) and the Rama a mean of 28.59 (tonne ha⁻¹). This discrepancy of results could be explained by genetic segregation of the Aguadulce variety from other types the authors examined. This agrees with the results of [Hammad et al. \(2018\)](#) and [Al-Sawaf, \(2023\)](#). For the green pod yield trait, the interaction effect was significant, where the combination of the third planting date with Aguadulce produced the highest mean of 48.30 tonnes ha⁻¹, while the combination of the first planting date with Rama led to the lowest mean of 20.56 tonnes ha⁻¹.

Table (6) Impact of early planting dates and different kinds and their interaction for green pod yield (ton ha⁻¹)

Dates	Varieties				Means
	Luz de otono	Rama	Aguadulce	Aquadlge	
15/9	34.50	20.56	37.29	24.74	29.27
1/10	34.89	23.82	46.43	40.80	36.49
15/10	37.48	41.39	48.30	31.07	39.56
Means varieties	35.62	28.59	44.01	32.21	
L.S.D _(0.05)	Dates= 7.316 Varieties= 4.929 Interaction=9.231				

Total seed yield (ton ha⁻¹)

The numerical comparison in Table (7) suggested large differences in the early planting dates and the types, but lack of significant interaction between these variables. Planting dates exerted a major effect on total seed yield in Table (7). Average yield was greatest for third planting date (October 15) which was 4.99 tonnes ha⁻¹ while first planting date (September 15) displayed the low average yield (3.22 tonnes ha⁻¹). The higher total yield of the third planting date is due to that higher number of pods per plant (Table 3) and seeds per pod (Table 4), all of which collectively affected their total yield. It was also found by Bashar and Khether, (2025). Table (7) shows that the variation had an obvious effect on this feature.

The Aguadulce variety exhibited the highest average yield of 5.03 tonnes ha⁻¹, not significantly distinct from the Aquadulce variety's average of 4.54 tonnes ha⁻¹, and the Rama variety registered the lowest average of 3.12 tonnes ha⁻¹. The superiority of the Aguadulce variety can be explained by enhanced yield components, namely with both an increase in the number of pods per plant (Table 3) and an increase in the number of seeds per pod (Table 4), with a greater yield overall. Those findings are in accordance with the work of Aleuzayr and Abdulqader, (2024) and Kadhim *et al.* (2024).

Table (7) shows the effect of early planting dates, varieties, and their interaction on total seed yield (ton ha⁻¹).

Dates	Varieties				Means
	Luz de otono	Rama	Aguadulce	Aquadlge	
15/9	2.43	2.05	4.78	3.63	3.22
1/10	2.99	2.47	5.07	5.19	3.93
15/10	5.10	4.84	5.23	4.80	4.99
Means varieties	3.50	3.12	5.03	4.54	
L.S.D _(0.05)	Dates= 1.28 Varieties= 1.07 Interaction= N.S				

CONCLUSIONS

The results revealed that the Aguadulce variety outperformed the other varieties in most yield-related traits and total seed yield. In contrast, the third planting date (15/10) resulted in superior performance for most yield traits and their components. These findings demonstrate the suitability of the Aguadulce variety and the third planting date (15/10) for achieving the highest productivity under the conditions of the study area.

Disclaimer: None

Conflict of interest: The authors declare that they have no relevant financial or non-financial interest to disclose.

Funding disclosure: None

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