Research in
ISSN : P-2409-0603, E-2409-9325
AGRICULTURE, LIVESTOCK and FISHERIES
An Open Access Peer-Reviewed International Journal

Article Code: 0397/2023/RALF
Article Type: Research Article

Res. Agric. Livest. Fish.
Vol. 10, No. 1, April 2023: 33-42.

RESPONSE OF SULPHUR FERTILIZATION AND WEED MANAGEMENT TO PERFORMANCE OF FABA BEAN (*Vicia faba* L.)

Md. Abdus Salam Miah, Mouli Mondal, Shivanand Jha, Shubroto Kumar Sarkar, Ahmed Khairul Hasan and Swapan Kumar Paul*

Department of Agronomy, Faculty of Agriculture, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh.

***Corresponding author:** Swapan Kumar Paul; **E-mail:** skpaul@bau.edu.bd

ARTICLE INFO

Received
04 April, 2023

Revised
27 April, 2023

Accepted
29 April, 2023

Online
May, 2023

Key words:
Faba bean
Sulphur
Weed
Yield

ABSTRACT

The experiment was conducted at the Agronomy Field Laboratory, Bangladesh Agricultural University, Mymensingh from November 2021 to April 2022 to assess the effect of sulphur fertilization and weed management on yield performance of faba bean. The experiment consisted of three levels of sulphur viz. 0, 20 and 40 kg S ha^{-1} and four levels of weed management practices viz. control (weedy check), weed free up to 30 days after sowing (DAS), weed free up to 60 DAS, weed free throughout the growth period. The experiment was laid out in a randomized complete block design with three replications. The highest number of branches $plant^{-1}$ (11.63), pods $plant^{-1}$ (70.68), seeds pod^{-1} (5.50), 1000-seed weight (267.9 g), seed yield (2.72 t ha^{-1}) and stover yield (2.93 t ha^{-1}) were recorded with 40 kg ha^{-1}. In case of weed management, the highest number of branches $plant^{-1}$ (10.16), pods $plant^{-1}$ (66.03), seeds pod^{-1} (6.0), 1000-seed weight (266.7 g), seed yield (2.43 t ha^{-1}), stover yield (2.85 t ha^{-1}) and harvest index (45.80%) was found at weed free throughout the growth period. Whereas the lowest values of all parameters were found minimum in weedy check. In interaction, the highest number of branches $plant^{-1}$ (13.0), pods $plant^{-1}$ (78.69), seeds pod^{-1} (7.0), 1000-seed weight (269.5 g), seed yield (2.87 t ha^{-1}), stover yield (2.98 t ha^{-1}) and harvest index (49.37%) were found in 40 kg ha^{-1} S with weed free throughout the growth period. Whereas the lowest parameters were found minimum in control. Therefore, application 40 kg ha^{-1} S along with weed free condition throughout the growth period appears as the suitable combination for faba bean cultivation.

To cite this article: Miah M. A. S., M. Mondal, S. Jha, S. K. Sarkar, A. K. Hasan and S. K. Paul, 2023. Response of sulphur fertilization and weed management to performance of faba bean (*Vicia faba* L.). Res. Agric. Livest. Fish. 10(1): 33-42.

DOI: https://doi.org/10.3329/ralf.v10i1.66217

INTRODUCTION

Faba bean (*Vicia faba* L.) is one of the important legumes used as human food and animal feed for industrialized countries (Gasim et al. 2015). It is currently produced in more than 66 countries over the world (Merga *et al*., 2019; Paul and Gupta, 2021).The crop contributes to soil health improvement through biological N-fixation (Rubiales and Mikic, 2015). It is an excellent source of protein, carbohydrates, and a good source of iron, magnesium, potassium, zinc, copper, selenium, and many vitamins which make it one of the best solutions to the malnutrition in developing countries (Sinha, 2012; Haciseferogullri et al. 2003). Faba bean is a good source of L-dopa for patients with Parkinson's disease (Ramirez-Moreno et al. 2015). Faba bean (*Vicia faba* L.) is an underutilized promising grain legume grown in limited locality of central and northern part of Bangladesh and well known as *Kalimatar*, *Baklakalai* and *Bhograkalai* (Yasmin et al. 2020; Paul and Gupta, 2021; Paul et al. 2021; Paul et al. 2022;). It can be grown in low fertile soils with less agricultural inputs compared to other pulse crops in winter season with minimum tillage (Biswas, 1988). It is an adaptable crop that has the capability to grow in numerous climatic zones (Singh et al. 2013). Various agronomic practices such as timely sowing, nutrient, weed and water management influences faba bean yield and seed quality.

Sulphur (S) is one of the elements known to be essential for the legume-rhizobium system with specific physiological and biochemical roles and often considered as the fourth major nutrient ranking below nitrogen, phosphorous and potassium (Marschner 1995). The S demand of legume crops is higher than that of cereal crops. Studies on different legumes have shown that the concentration of the S-containing amino acids was markedly declined with decreasing S supply (Gaylor and Sykes, 1985). Sulphur fertilization influence nitrogen fixation, grain yield and seed quality (Cazzato et al. 2012; Głowacka et al. 2019). Weeds are often the vital biological constraints to growing field crops. It is not only reduce crop yields but also impede other agricultural operations and serve as an alternative host for a wide variety of pests and diseases. Weed infestation is a major constraint in faba bean production, and can reduce yield by up to 50% (Frenda et al. 2013). Thus, early weed removal during the period between 25 and 75 days after sowing is necessary if a high yield is to be obtained (Tawaha and Turk, 2001). Weeds reduced seed and straw yields by 35%-57% and 29%-31%, respectively (Brady, 2008). The above information revealed that sulphur fertilization and weed control significantly influence on seed yield and quality of faba bean.

MATERIALS AND METHODS

Experimental location, site and soil

The experiment was carried out at the Agronomy Field Laboratory, Bangladesh Agricultural University, Mymensingh from November 2021 to April 2022. The experimental site was located at 24.75°N latitude and 90.50°E longitude of 18 m above from the sea level. The experimental site belongs to the Old Brahmaputra Floodplain (AEZ-9) (UNDP and FAO, 1988). The experimental plot is medium high land having silty loam texture with pH 6.9, electrical conductivity (EC) 0.4 ds/m, organic carbon 1.00%, N 0.09%, P 1.60 ppm, K 0.10% meq/100g soil, Ca 8.30 meq/100 g soil, Mg 3.29 meq/100 g soil, S 2.98 ppm, Zn 0.21 ppm and B 0.23 ppm.

Experimentation

The experiment comprised three level of Sulphur viz., i) 0, ii) 20 iii) 40 kg ha-1 and four weed free periods viz. weedy check (no weed free period) (W_0), weed free up to 30 days after sowing (DAS) (W_1), weed free up to 60 DAS (W_3) and weed free throughout the growth period (W_4). The two factors experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. There were 36 unit plots altogether in the experiment. The size of each plot was 2.5 m × 2.0 m. The distance maintained between two blocks and two plots were 1m and 0.5 m, respectively.

Crop Husbandry

Faba bean seeds were collected from Pirgonj Upazilla, Rangpur District, used in the experiment. The land was fertilized with urea, triple super phosphate (TSP), muriate of potash (MP), boron and zinc at the rate of 25 kg ha^{-1}, 90 kg ha^{-1}, 70 kg ha^{-1}, 2 kg ha^{-1} and 2 kg ha^{-1}, respectively as control treatment. The entire amount of triple super phosphate (TSP), muriate of potash (MoP), boron, zinc and ½ of urea as basal dose were applied at the final land preparation. Rest of the ½ dose of urea was applied at 20 days after sowing (DAS). Sulpur was applied as zinc sulphate during final land preparation. Before sowing of seed, the seeds were soaked in water over night to soften the seed coat. After that, in the next day seeds were sown at their respective seed rates. The seeds are sown in the furrow maintaining spacing of 30 cm

× 20 cm on 14 November, 2021 and the furrows were covered with the soils soon after seeding. The seeds were covered with pulverized soil just after sowing and gently pressed with hands. Seed germination occurred from 5-6-day of sowing. On the 10-day nearly all baby plants (seedlings) came out of the soil. After establishment of seedlings, various intercultural operations were accomplished for better growth and development of the faba bean. During seed sowing, few seeds were sown in the border of the plots. Seedlings were transferred to fill up the gap where seeds failed to germinate. All gaps were filled up within two weeks after germination of seeds. After the establishment of the plant, one healthy plant per hill was kept and remaining one was plucked. Weed control was done following treatment specification.

Data Collection

Four plants were selected randomly from each unit plot and uprooted to record data on crop characters and yield components. After sampling, the whole plot was harvested at full maturity. The harvested crops of each plot were bundled and properly tagged sun dried for three days. Seeds were separated from the plant, cleaned and sun dried for two consecutive days for achieving safe moisture content. Seed and stover obtained from four sample plants were added with the whole plot harvest to get the actual seed and stover yields. Finally seed and stover yields plot^{-1} were recorded and converted to t ha^{-1}.

Statistical analysis

Data on different parameters were compiled and tabulated in proper form for statistical analysis. Analysis of variance (ANOVA) was done with the help of computer package MSTAT-C. The mean differences among the treatments were adjusted by Duncan’s Multiple Range Test (Gomez and Gomez, 1984).

RESULTS

Number of branches plant^{-1}

There was highly significant variation on number of branches plant^{-1} due to the effect of sulphur fertilization. The maximum number of branches plant^{-1} (11.63) was obtained from the treatment of S_2 (40 kg ha^{-1}) whereas control treatment S_0 (0 kg ha^{-1}) produced the minimum number of branches (6.29) (Table 1). There was highly significant variation on number of branches plant^{-1} due to the effect of weed management practices. However, the maximum number of branches (10.17) was obtained from the treatment of W_3 (weed free conditions throughout the growth period) when the control treatment W_0 (no weeding) produced the least number of branches (8.06) (Table 2). There was significant variation on number of branches plant^{-1} due to the combined effect of sulphur fertilization and weed management practices. However, the maximum number of branches (13.0) was obtained from the treatment of S_2W_3 (40 kg ha^{-1} S with weed free conditions throughout the growth period) whereas control treatment S_0W_0 (0 kg ha^{-1} S with no weeding) showed the minimum number of branches (5.00) (Table 3).

Number of pods plant^{-1}

Number of pods plant^{-1} differed significantly due to the application of sulphur fertilization. Table 1 shows that maximum number of pods plant^{-1} (70.68) was recorded from the treatment of S_2 (40 kg ha^{-1}) when the control treatment (S_0) gave the minimum number of pods plant^{-1} (56.29). Number of pods plant^{-1} differed highly significant due to the weed management practices. The maximum number of pods plant^{-1} (66.03) was recorded from the treatment of W_3 (weed free conditions throughout the growth period) when the control treatment (W_0) produced the minimum number of pods plant^{-1} (57.77) (Table 2). Due to proper weed management practices the plants got the chances for better plant nutrients and minerals for the better growth and development of plants. Number of pods plant^{-1} differed highly significant due to the interaction effect of sulphur fertilization and weed management practices. The maximum number of pods plant^{-1} (78.69) was recorded from the treatment of S_2W_3 (40 kg ha^{-1} S with weed free conditions throughout the growth period) and the control treatment (W_0S_0) produced the minimum number of pods plant^{-1} (55.08) (Table 3).

Table 1. Effect of sulphur fertilization on yield and yield components of faba bean

Treatment	Branches plant^{-1} (no.)	Number of pod plant^{-1}	Number of seeds pod^{-1}	1000-seed weight (g)	Stover yield (t ha^{-1})	Biological yield (t ha^{-1})	Harvest index (%)
S_0	6.29c	56.29b	3.75b	263.1c	2.66c	4.21c	36.55c
S_1	9.21b	62.38b	4.75ab	265.3b	2.79b	5.00b	44.24b
S_2	11.63a	70.68a	5.50a	267.9a	2.93a	5.66a	48.16a
Level of sig.	**	**	**	**	**	**	**
CV (%)	4.39	5.10	21.99	0.18	3.75	2.57	5.47

** Significant at 1% level of probability; * Significant at 5% level of probability S_0 = 0 kg ha^{-1}, S_1 = 20 kg ha^{-1}, S_2 = 40 kg ha^{-1}

Number of seeds pod^{-1}

Number of seeds pod^{-1} differed significantly due to application of sulphur fertilization. The highest number of seeds pod^{-1} (5.5) was recorded from S_2 (40 kg ha^{-1}), while the minimum (3.75) was counted from S_0 (control). It was revealed that the number of seeds pod^{-1} was varied due to using different doses of sulphur fertilization (Table 1). The number of seeds pod^{-1} showed different significant properties due to weed management practices. The maximum number of seeds pod^{-1} (6.0) was recorded from W_3 (weed free conditions throughout the growth period), while the minimum (3.78) was counted from W_0 (control). It was also revealed that the number of seeds pod^{-1} was increased due to timely weed management practices (Table 2). The number of seeds pod^{-1} showed non-significant interaction effects due to application of different levels of sulphur fertilization and weeding. However, numerically the maximum number of seeds per pod (7.0) was recorded from S_2W_3 (40 kg ha^{-1} S with weed free conditions throughout the growth period), while the minimum (3.33) was counted from S_0W_0 (control). It was also revealed that the number of seeds pod^{-1} was increased by the combined effects of sulphur fertilization and timely weeding practices (Table 3).

1000-seed yield

The weight of one thousand 1000-seeds was observed significant due to the application of sulphur fertilization. The highest weight (267.9 g) of 1000-seeds was noticed in the from the treatment dose of S_2 (40 kg ha^{-1}) whereas the minimum weight (263.1 g) was observed in control treatment (Table 1). The weight of 1000-seeds was seen statistically significant due to timely weed management practices. The highest weight (266.7 g) of 1000-seeds was measured in W_3 (Weed free conditions throughout the growth period) whereas the minimum weight (264.5 g) was observed at control (Table 2). The weight of 1000-seeds was detected highly significant due to the interaction effects of the application of sulphur fertilization and weed management practices. The highest weight (269.5 g) of 1000-seeds was measured in the treatment dose of S_2W_3 (40 kg ha^{-1} S with weed free conditions throughout the growth period), whereas the minimum weight (262.8 g) was observed in control treatment (Table 3).

Seed yield

Significant variation was observed due to sulphur fertilization in respect of seed yield (t ha^{-1}). The highest seed yield (2.73 t ha^{-1}) was recorded from S_2 (40 kg ha^{-1}) followed by S_1 (20 kg ha^{-1}) was 2.22 t ha^{-1} and S_0 (control) produced the lowest yield (1.54 t ha^{-1}), respectively (Figure 1). Significant variation was noticed due to timely weeding in respect of seed yield. The highest seed yield (2.43 t ha^{-1}) was observed from W_3 (weed free conditions throughout the growth period) followed by W_2 (weed free up to 60 DAS) was 2.23 t ha^{-1} and W_0 (control) produced the lowest yield (1.85 t ha^{-1}), respectively (Figure 2). Significant variation was spotted due to the combined effects of fertilization in respect of seed yield (t ha^{-1}) and weed management practices. Figure 3 shows that the highest seed yield (2.87 t ha^{-1}) was obtained from S_2W_3 (40 kg ha^{-1} S with weed free conditions throughout the growth period), followed by (2.74 t ha^{-1}) S_2W_2 (20 kg ha^{-1} S with weed free up to 60 DAS) which was at par (2.73 t ha^{-1}) with S_2W_1 (20 kg ha^{-1} S with weed free up to 30 DAS) and S_0W_0 (control) produced the lowest yield (1.04 t ha^{-1}).

Table 2. Effect of weed management on yield and yield components of faba bean

Treatment	Branches plant^{-1} (no.)	Number of pods plant^{-1}	Number of seeds pod^{-1}	1000-seed weight (g)	Stover yield (t ha^{-1})	Biological yield (t ha^{-1})	Harvest index (%)
W_0	8.06d	57.77d	3.78c	264.5c	2.73b	4.58d	39.21c
W_1	8.67c	64.14c	4.33bc	265.0c	2.76ab	4.90c	43.25b
W_2	9.28b	64.53b	4.56b	265.5b	2.83ab	5.07b	43.67ab
W_3	10.17a	66.03a	6.00a	266.7a	2.85a	5.28a	45.80a
Level of sig.	**	**	**	**	*	**	**
CV (%)	4.39	5.10	21.99	3.50	3.75	2.57	5.47

** Significant at 1% level of probability; * Significant at 5% level of probability; W_0 = No weed free period, W_1= Weed free up to 30 days after sowing (DAS), W_2 = Weed free up to 60 DAS, W_3 =Weed free throughout the growth period.

Table 3. Interaction effect of sulphur fertilization and weed management practices on yield and yield components of faba bean

Treatment	Branches plant^{-1} (no.)	Number of pods plant^{-1}	Number of seeds pod^{-1}	1000-seed weight (g)	Stover yield (t ha^{-1})	Harvest index (%)
S_0W_0	5.00k	55.08de	3.33fg	262.8g	2.51f	29.35g
S_0W_1	6.00j	57.08de	3.67efg	263.0g	2.65e	36.94f
S_0W_2	6.67i	53.58e	3.00g	262.8g	2.72de	38.28f
S_0W_3	7.50h	59.40cde	5.00c	263.7f	2.73de	41.42e
S_1W_0	8.67g	59.99cde	4.00def	264.1ef	2.74de	41.57e
S_1W_1	9.00fg	63.08cd	4.33cde	264.4e	2.75d	43.94d
S_1W_2	9.17f	66.43bc	4.67cd	265.7d	2.80cd	44.84cd
S_1W_3	10.00e	60.00cde	6.00b	266.9c	2.86bc	46.50bc
S_2W_0	10.50d	58.22cde	4.00def	266.6c	2.86bc	46.62bc
S_2W_1	11.00c	72.25ab	5.00c	267.5b	2.94ab	47.88b
S_2W_2	12.00b	73.57ab	6.00b	267.8b	2.95ab	48.88ab
S_2W_3	13.00a	78.69a	7.00a	269.5a	2.98a	49.37a
Level sig.	*	**	**	**	*	*
CV (%)	4.39	5.10	21.99	3.50	5.70	5.47

**= Significant at 1% level of probability; *= Significant at 5% level of probability; S_0 = 0 kg S ha^{-1}, S_1 = 20 kg S ha^{-1}, S_2 = 40 kg S ha^{-1}; W_0 = no weeding, W_1= weed free conditions up to 30 days after sowing (DAS), W_2 = weed free conditions up to 60 DAS, W_3 =weed free conditions throughout the growth period

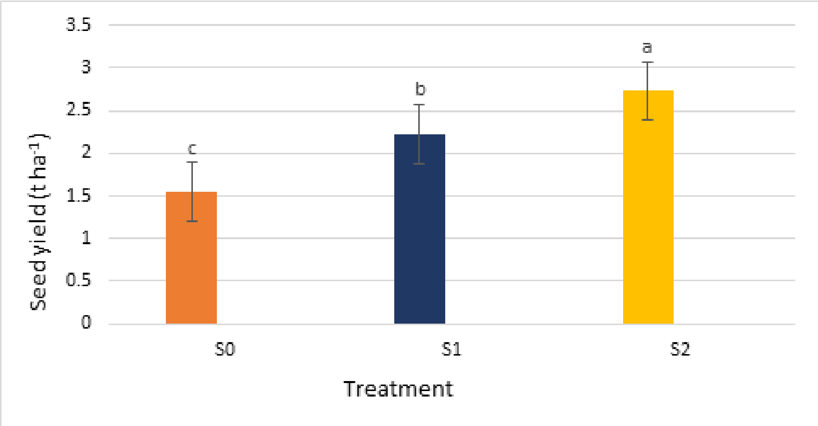

Figure 1. Effect of sulphur fertilization on yield and yield components of faba bean
S_0 = 0 kg ha^{-1}, S_1 = 20 kg ha^{-1}, S_2 = 40 kg ha^{-1}

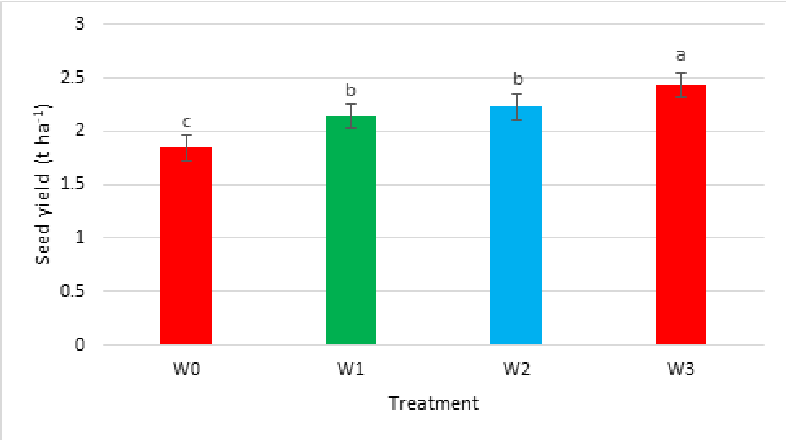

Figure 2. Effect of weed management on yield and yield components of faba bean
W_0 = no weeding, W_1= weed free conditions up to 30 days after sowing (DAS), W_2 = weed free conditions up to 60 DAS, W_3 =weed free conditions throughout the growth period

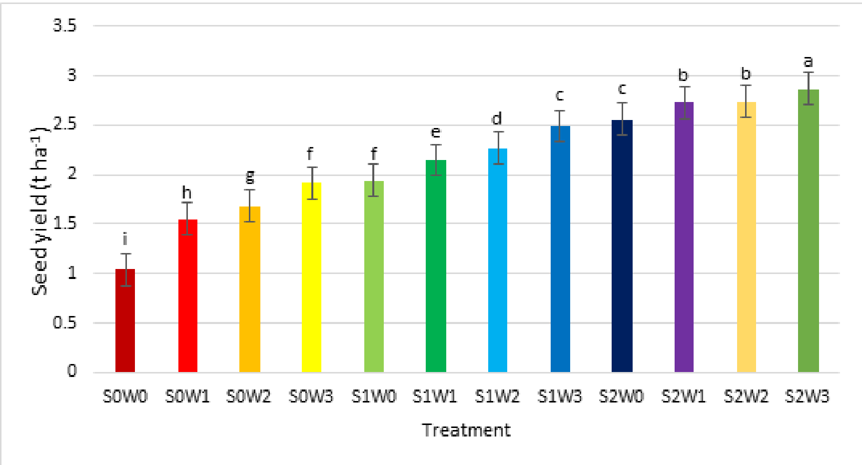

Figure 3. Interaction effect of sulphur fertilization and weed management practices on yield and yield components of faba bean
S_0 = 0 kg S ha^{-1}, S_1 = 20 kg S ha^{-1}, S_2 = 40 kg S ha^{-1}; W_0 = no weeding, W_1= weed free conditions up to 30 days after sowing (DAS), W_2 = weed free conditions up to 60 DAS, W_3 =weed free conditions throughout the growth period

Stover yield

A significant variation in stover yield was noticed due to the effect of sulphur fertilization. The highest stover yield (2.93 t ha^{-1}) was obtained at the dose of S_2 (40 kg ha^{-1}) whereas the lowest stover yield (2.66 t ha^{-1}) was obtained at control (S_0) (Table 1). A significant variation in stover yield was noticed due to the effect of various weeding practices. The highest stover yield (2.85 t ha^{-1}) was obtained at the treatment levels of W_3 (weed free conditions throughout the growth period) whereas the lowest stover yield (2.73 t ha^{-1}) was obtained at control (W_0) (Table 2). A significant result in stover yield was noticed due to the mutual effect of sulphur fertilization and weed management practices. However, the highest yield (2.98 t ha^{-1}) of stover was obtained from the treatment of S_2W_3 (40 kg ha^{-1} S with weed free conditions throughout the growth period), followed by 2.95 t ha^{-1} from S_2W_2 (20 kg ha^{-1} S with weed free conditions up to 60 DAS) was 2.95 t ha^{-1} that is closed to S_2W_1 (20 kg ha^{-1} S with weed free conditions up to 30 DAS) was 2.94 t ha^{-1} and S_0W_0 (control) produced the lowest stover yield (2.51 t ha^{-1}), respectively (Table 3).

Harvest index

The result of different doses of fertilization revealed that there was significant variation. The highest harvest index value (48.16 %) was calculated at the treatment S_2 (40 kg S ha^{-1}) which was near about S_1 (20 kg S ha^{-1}) 44.24% and the lowest value (36.55 %) was calculated at the treatment of S_0 (control) (Table 1). The result of main effect of specific weed management practices revealed that there was highly significant variation among different weeding treatment for harvest index of the crop. The highest harvest index value (45.8%) was calculated at the treatment of W_3 (weed free conditions throughout the growth period) which was nearby W_2 (weed free up to 60 DAS) and the lowermost value (39.21%) was calculated at the treatment of W_0 (control) (Table 2). The result of foremost joint effects of diverse doses of fertilization and weeding revealed that there was significant variation among different levels of sulphur for harvest index of the crop. The highest harvest index value (49.37%) was calculated at the treatment of S_2W_3 (40 kg ha^{-1} S with weed free conditions throughout the growth period) which was at par (48.88%) with S_2W_2 (20 kg ha^{-1} S with weed free conditions up to 60 DAS) and S_0W_0 (control) showed the lowest value (29.35 %) (Table 3).

DISCUSSION

In this study, the yield of faba bean increased significantly due to the application of different levels of sulphur fertilization. The number of branches plant^{-1}, number of pods plant^{-1}, number of seeds pod^{-1}, 1000-seed weight, seed yield, stover yield, biological yield and harvest index was maximum with 40 kg ha^{-1} over control. Due to the variation of fertilization the plant employed to get chance for more spreading and produced more branches, pods, seeds pod^{-1}, heaviest seed and seed yield. Similar trend was reported elsewhere (Barłóg *et al.*, 2018; Omer *et al.,* 2020; Shimelis *et al.,* 2022). Ebbisa and Amdemariam (2021) who found S fertilization gave statically maximum branches, maximum number of pods plant^{-1}, 1000-seed weight, grain yield, biomass yield and harvest index than over control. It was concluded that faba bean was mostly responsive to sulphur fertilization treatment for the better performance on growth and yield. The present observation is also similar to the result that found by Ali *et al.* (2013); Adhikary *et al.* (2018) and Kahlel *et al.* (2020).

This experiment showed significant variations on the growth and yield performance of faba bean occurred due to weed management practices. Results revealed that number of branches plant^{-1} was maximum due to proper weed management practices. The number of pods plant^{-1}, number of seeds pod^{-1}, 1000-seed weight, seed yield, stover yield, and biological yield and harvest index showed the best performance because of weed free conditions of the field throughout the growth period. Due to proper weed management practices the plants got the chances for better plant nutrients, and minerals for the better growth and development of plants. On the other hand, the lowest results were found in control treatment (no weeding during the growth period of faba bean and it may be caused due to the crop weed competition for light, air and nutrients for growth and development. Bezabih *et al.* (2022) found the similar result that, grain yield was highest (2.49 vs.2.12 Mg ha^{-1}) for the improved weed management and lowest for the no weeding in the crop field. Similar result was also reported by Alsaadawi *et al.* (2013) and Barłóg *et al.* (2018). It may be concluded that faba bean is highly sensitive to weed management practices for better performance of growth and yield. The present observation is also agreed to the result of that found by Daba and Sharma (2018) and Gomaa *et al.* (2022). This study represent variation in results for the growth and yield performance of faba bean due to the combined effect of different levels of S fertilization and weed management practices. Among the interaction treatments viz. 40 kg ha^{-1} S with weed free conditions throughout the growth period showed the best growth and yield performance over other combinations as well as control. These variations between weeds and crops might be due to the competition for nutrient, space, air, moisture and light among the plants. Significant combined effects were found due to the combination of different levels of sulphur fertilization and weed management practices in respect of growth and yield contributing characters. The number of branches plant^{-1}, number of pods plant^{-1}, number of seeds pod^{-1}, 1000-seed weight, seed yield, stover yield, biological yield and harvest index were found in 40 kg S ha^{-1} with weed free conditions throughout the growth period. The number of seeds pod^{-1} was significantly affected by the interaction effect of S fertilization and weeding practices. Similar result was reported by Gebeyehu (2021). The maximum seed yield due to the combined effect of S fertilization and weeding practices for the seed and stover yields were also found in mustard (Kumar *et al.* 2021). Discussion indicated that sulphur fertilization and weeding practices promote branching, influence seed bearing capacity, seed size and ultimately yield of faba bean.

CONCLUSION

The maximum number of branches plant^{-1}, pods plant^{-1}, seeds pod^{-1}, 1000-seed weight, seed yield and stover yield with 40 kg ha^{-1}. Weed free throughout the growth period produced the tallest plant, branches plant^{-1}, pods plant^{-1}, seeds pod^{-1}, 1000-seed weight, seed yield and stover yield while the lowest values of all parameters were found in weedy check treatment. In case of interaction, maximum branches plant^{-1}, pods plant^{-1}, seeds pod^{-1}, 1000-seed weight, seed yield and stover yield were found in 40 kg ha^{-1} S with weed free throughout the growth period. Considering the above findings, the combination of 40 kg ha^{-1} S with weed free condition throughout the growth period may be recommendable for faba bean production.

ACKNOWLEDGEMENT

The financial assistance of Ministry of Science and Technology, Government of the People's Republic of Bangladesh, to conduct the research project is thankfully acknowledged.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

REFERENCES

1. Adhikary P, Hansda A, and Patra PS, 2018. Combined effect of pesticides, sulphur and boron on yield of sesame in alluvial soil of West Bengal. Bulletin of Environment, Pharmacology and Life Sciences, 7(1): 67-70.
2. Ali J, Singh SP, and Singh S, 2013. Response of faba bean to boron, zinc and Sulphur application in alluvial soil. Journal of the Indian Society of Soil Science, 61(3): 202-206.
3. Alsaadawi IS, Khaliq A, Lahmod NR, and Matloob A, 2013. Weed management in broad bean (*Vicia faba* L.) through allelopathic *Sorghum bicolor* (L.) Moench residues and reduced rate of a pre-plant herbicide. Allelopathy Journal, 32(2): 203-212.
4. Barłóg P, Grzebisz W, and Łukowiak R, 2018. Faba bean yield and growth dynamics in response to soil potassium availability and sulfur application. Field Crops Research, 219: 87-97
5. Bezabih M, Mekonnen K, Adie A, Tadesse T, Nurfeta A, Dubale W, Habiso T, Kelkay TZ, Getnet M, Ergano K, and Duncan AJ, 2022. Redesigning traditional weed management practices in faba bean fields to optimize food-feed production in the smallholder system. Agronomy Journal, 114(1): 248-58.
6. Biswas BK, 1988. Genotype and environment interaction in faba bean. M.Sc. Thesis, Department of Genetics and Plant Breeding, Bangladesh Agricultural University. pp. 1-40.
7. Brady KA, 2008. Effect of weeding regimes on faba bean (*Vicia faba* L.) yield in the Northern State of Sudan. University of Khartoum Journal of Agricultural Sciences, 15 (2): 220-231.

8. Cazzato E, Tufarelli V, Ceci E, Stellacci AM, and Laudadio V, 2012. Quality, yield and nitrogen fixation of faba bean seeds as affected by sulphur fertilization, Acta Agriculturae Scandinavica, Section B -Soil & Plant Science, 62(8):732- 738.
9. Daba NA, and Sharma J, 2018 Assessment of integrated weed management practices on weed dynamics, yield components and yield of faba bean (*Vicia faba* L.) in Eastern Ethiopia. Turkish Journal of Agriculture-Food Science and Technology, 6(5):570-580.
10. Ebbisa A, and Amdemariam T, 2021. Effects of NPS and bio-organic fertilizers on yield and yield components of faba bean (*Vicia faba* L.) in Gozamin District, East Gojjam, Ethiopia. Preprints 2021020079
11. Frenda SA, Ruisi P, Saia S, Frangipane B, Miceli GD, Amato G, and Giambalvo D, 2013. The critical period of weed control in faba bean and chickpea in Mediterranean areas. Weed Science, 61: 452-459.
12. Gasim S, Hamad SAA, Abdelmula A, and Ahmed IAM, 2015. Yield and quality attributes of faba bean inbred lines grown under marginal environmental conditions of Sudan. Food Science & Nutrition, 3(6): 539–547.
13. Gaylor GC, and Sykes GE, 1985. Effect of nutritional stress on the storage proteins of soybeans. Plant Physiology, 78: 582-585.
14. Gebeyehu B, 2021. Effects of rhizobium inoculation and blended fertilizer rate on yield and yield components of faba bean (*Vicia faba* L.) in Dangila District, Northwestern Ethiopia. International Journal of Research inAgricultural Sciences, 8(1): 55-63.
15. Glowacka A, Gruszecki T, Szostak B, and Michalek S, 2019. The response of common bean to sulphur and molybdenum fertilization. International Journal of Agronomy 2019: Article ID 3830712. 8 p.
16. Gomaa M, Fathalla Rehab I, Abou Zied K, and Hazawy HM 2022: Assessment of Faba Bean (*Vica faba* L.) Productivity under Different Weed Control Methods. Journal of the Advances in Agricultural Researches, 27(2): 305-314.
17. Gomez KA, and Gomez AA, 1984. Statistical Procedures for Agricultural Research 2nd Edn. A Wiley Inter-Science Publications, John Wiley and Sons, New York. pp. 202-215.
18. Haciseferogullari H, Gezer I, Bahtiyarca Y, and Menges H, 2003. Determination of some chemical and physical properties of Sakız faba bean (*Vicia faba* L. Var. major). Journal of Food Engineering, 60: 475-479.
19. Kahlel A, Ghidan A, Al-Antary TA, Alshomali I, and Asoufi H 2020, Effects of nano technology liquid fertilizers on certain vegetative growth of broad bean (*Vicia faba* L.). Fresenius Environmental Bulletin, 29(6): 4763-4768.
20. Kumar R, Yadav SS, Singh U, and Verma HP 2021. Growth, Yield, Quality and Energetics of Mustard (*Brassica juncea* (L.) Czern & Coss) as influenced by Weed Management and Sulphur Fertilization under Semi-Arid Condition ofRajasthan. International Journal of Bio-Resource & Stress Management, 12(4): 255-263.
21. Marschner H, 1995. Mineral Nutrition of Higher plants. Academic Press, California, USA. p. 889.
22. Merga B, Egigu MC, and Wakgari M, 2019. Reconsidering the economic and nutritional importance of faba bean in Ethiopian context. Cogent Food and Agriculture, 5: 6839 38.
23. Omer ZS, Nadeau E, Stoltz E, Edin E, and Wallenhammar AC, 2020. Effects of Sulphur fertilization in organically cultivated faba bean. Agricultural and Food Science, 29(5): 471-481.
24. Paul SK, and Gupta DR, 2021. Faba bean (*Vicia faba* L.), a promising grain legume crop of Bangladesh: A review. Agricultural Reviews, 42(3): 292-299.
25. Paul SK, Gupta DR, Mahmud NU, Muzahid ANM, and Islam MT. 2022. First Report of Collar and Root Rot of Faba Bean Caused by *Rhizoctonia solani* AG-2-2 IIIB in Bangladesh. Plant Disease, 106(3): 1072.
26. Paul SK, Mondal M, Sarker UK, and Sarkar SK, 2021. Response of yield and seed quality of faba bean (*Vicia faba*) to irrigation and nutrient management. Research on Crops, 22(2): 256-264.
27. Ramírez-Moreno JM, Salguero BI, Romaskevych O, and Duran-Herrera MC, 2015. Broad Bean (*Vicia faba*) consumption and Parkinson's disease: natural source of L-dopa to consider. Neurología, 30: 375-376.
28. Rubiales D, and Mikic A, 2015. Introduction: Legumes in sustainable agriculture. Critical Reviews in Plant Sciences, 34: 1-3. Scherer, H. W. and Lange, A. 1996. N2 fixation and growth of legumes as affected by sulphur fertilization. Biology Fertility and Soils, 23: 449-453.

29. Shimelis F, Admasu A, Mulatu Z, Worku W, Bekele D, and Dobocha D, 2022. Responseof different fertilizer levels on growth, yield and yield components of faba bean (*Vicia faba* L.) varieties at Oromia Regional State, Ethiopia. Asian Journal of Advances in Agricultural Research, 18(1):1-8.
30. Singh AK, Bharati RC, Manibhushan NC, and Pedpati A, 2013. An assessment of faba bean (*Vicia faba* L.) current status and future prospect. African Journal of Agricultural Research, 8: 6634-6641.
31. Sinha SK, 2012. Faba bean: a potential alternative grain legume of future. Rashtriya Krishi. 7(1): 45-46.
32. Tawaha AM, and Turk MA, 2001. Crop-weed competition studies in faba bean (*Vicia faba* L.) under rainfed conditions. Acta Agronomica Hungarica, 49, 299–303.
33. UNDP, and FAO, 1988. Land Resources Appraisal of Bangladesh for Agricultural Development, Report No. 2. Agro-ecological Regions of Bangladesh. United Nations Development Programme and Food and Agriculture Organization
34. Yasmin W, Paul SK, and Anwar MP, 2020. Growth, yield and quality of faba bean (*Vicia faba* L.) in response to sowing date and phosphorus fertilization. Archives of Agriculture and Environmental Science, 5(1): 11-17.