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Assessment of the Effects of Selected AM Strain on the Growth and Yield of Brinjal

Most. Bilkis Banu [a], Musharraf Hossain Mian [b], M. Mazibur Rahman [b], Abu Zofar Md. Moslehuddin [b] and Mohammad Quamrul Islam Matin [c*]

[a] Soil Science Division, Bangladesh Agricultural Research Institute, Gazipur-1701, Bangladesh.
[b] Department of Soil Science, Bangladesh Agricultural University, Mymensingh, Bangladesh.
[c] Plant Breeding Division, Bangladesh Agricultural Research Institute, Gazipur-1701, Bangladesh.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Arbuscular mycorrhizal (AM) fungi can increase plant uptake of nutrients especially relatively immobile elements such as P, Zn and Cu and consequently, improve plant growth and yield. The study was conducted to identify native AM strains, multiply and test their effects in reduction of P fertilizer brinjal production. Rhizosphere soils and roots of and brinjal were collected from each of four AEZs, viz. AEZ-9 (RARS, Jamalpur), AEZ-11 (RARS, Jashore), AEZ-25 (ARS, Bogura) and AEZ-28 (BARI, Joydebpur) in 2014-2015. Characterization and identification of arbuscular mycorrhizal strains was studied in the microbiology laboratory of Bangladesh Agricultural Research Institute (BARI). Nine AM strains such as *Glomus geosporum, G. mosseae, G. fasciculatum, Acaulospora dilatata, A. mellea, A. morrowiae, Entrophospora infrequens, Sclerocystis coremioides* and *Gigaspora margarita* were identified in brinjal. The collected mycorrhizal strains were maintained with trap crop sorghum under net house condition in 2014-2015 onwards. The best performing AM strain (*Glomus mosseae*) was selected from pot experiments at greenhouse of BARI. The sandy clay loam soil was used as the potting media. Nine each AM strains each from brinjal were tested with corresponding crops. Randomized Complete Block Design (RCBD) was followed with four replications. Dry matter yield (both root and shoot), some vegetative parameter, % root colonization and number of spores were observed. Finally the efficiency of the selected mycorrhiza, *Glomus mosseae* was tested under field condition during 2016-2017 and 2017-2018.

**Corresponding author: E-mail: quamrul_islam76@yahoo.com;*

Factorial RCBD was followed for field experiments with eight treatments and four replications. Selected soil-based AM inoculum (*Glomus mosseae*) that preserved in sorghum culture were used in seedbed of respective crops. Many morphological parameters and yield attributes were found as highest from 75% P. The highest crop yield was found from 75% P+AM, which was statistically similar to 100% P-AM indicating the possibility of saving 25% P in these three crops in AEZ 28 of Bangladesh. It was observed that *Glomus mosseae* could save 25% P in brinjal cultivation.

Keywords: AM strain; growth; yield; brinjal; Glomus mosseae.

1. INTRODUCTION

The mycorrhizal infection enhances plant growth by increasing nutrient uptake through increasing the absorbing area of root and by mobilizing sparingly available nutrient sources; or by excretion of chelating compounds or ecto enzymes [1].

Arbuscular mycorrhizal fungi inoculation produced significantly higher plant growth compared to the untreated control pepper [2] onions, [3] and vegetable crops [4]. Bioaugmentation with native arbuscular mycorrhiza fungi was also reported to improve the qualities of seedlings in nurseries [5].

The AMF can improve the nutrient and water supply, induce tolerance of environmental stress and resistance to root diseases and nematodes of their host plants. Arbuscular mycorrhizal fungi improved the absorption of several plant nutrients like N, P, K, Mg, Cu, Ca and Fe by the roots of plants [6]. The AM fungi can increase plant uptake of nutrients and consequently increase root and shoot biomass and improve plant growth and yield [7].

Mycorrhizal fungi are well known to have a wide range of benefits to their host plants. They can enhance nutrient uptake especially P, N and Zn. They can also suppress soil pathogens, enhance tolerance to drought stress and reduce sensitivity to toxic substances contaminated to the soil [8]. Arbuscular mycorrhizal fungi have received considerable attention in the literature due to their potential benefits to host plants by enhancing plant nutrient uptake and increasing tolerance to adverse conditions [9].

Lenin [10] studied the effects of arbuscular mycorrhizal fungi (AM) on the morphological and biochemical changes of four different vegetable seedlings such as tomato (*Lycopersicum esculentum* L.), brinjal (*Solanum melongena* L.), chilli (*Capsicum annuum* L.) and bhendhi (*Abelmoschus esculentus* Moench.) grown under nursery conditions. They revealed the symbiotic association between AM fungi and plant roots provides a significant contribution to plant nutrition and growth.

Eggplant (*Solanum melongena* L.) is a major vegetable of Bangladesh available more or less throughout the year. It is popular for the preparation of various dishes in different regions of the country. As it contains certain medicinal properties, it is used in ayurvedic medicines. It is rich in vitamin A, B and good source of potassium and other essential nutrients [11]. It occupies the area of total 0.51 lakh ha with the production of 5.0 lakh ton [12].

Consumption and demands for vegetables and spices in Bangladesh are increasing day by day. Brinjal is important for human diet for their high yield and nutritive values [11].

Considering the above facts, the present study was undertaken to identify the effective AM stain and to assess the effect in reducing the P fertilizer.

2. MATERIALS AND METHODS

Field experiments with brinjal were conducted using AM strain *Glomus mosseae* collected from respective crop fields with rhizosphere soils and multiplied and maintained in sorghum trap culture. Soils from sorghum pots rich in AM strains was used in nursery bed of each crop during seedling production. Eight (four crops × two years) field experiments were carried out during rabi season of 2016-2017 and 2017-2018.

One AM strain, *Glomus mosseae,* was found as best performer in all the crops in the third experiment. In the current experiment effect of this AM strain was tested in field condition of all four crops for two consecutive years. Two field experiments were carried out during rabi season of 2016-2017 and 2017-2018 at experimental farm of Soil Science Division, Bangladesh Agricultural Research Institute, Joydebpur,

Table 1. Physical and chemical properties of soils under study

AEZ and	Texture	pH	OM	Ca Mg		K	Total N	P	S	Zn	B	Fe	Cu	Mn
Locations			**(%)**	**meq/100 g soil**			**(%)**	**μg g-1**						
AEZ-09 (Jamalpur)	Sandy Clay loam	7.1	1.63	6.0	2.4	0.16	0.086	10	17	1.19	0.28	44	1.6	3.1
AEZ-11 (Jashore)	Clay loam	7.4	1.42	6.4	2.1	0.16	0.075	14	15	1.71	0.35	30	2.4	2.3
AEZ-25 (Bogura)	Silty clay loam	6.3	1.42	6.8	2.3	0.13	0.075	22	19	1.64	0.30	36	2.2	4.1
AEZ-28 (Joydebpur)	Clay loam	6.5	0.87	4.8	1.7	0.20	0.042	11	12	0.90	0.30	51	1.7	2.8

Table 2. Initial fertility status of the soil samples of potting media during 2014-2015

Properties	Texture	pH	OM	Ca	Mg	K	Total N	P	S	B	Cu	Fe	Mn	Zn
			(%)	**meq 1**	**00g-1**		**(%)**	**µg g-1**						
Values	Sandy clay loam	7.0	1.76	9.3	3.0	0.12	0.09	8.22	5.0	0.12	1.1	24	2.2	1.05
Critical level				2.0	0.5	0.12	-	10	10	0.20	0.20	4.0	1.0	0.60

Gazipur, Bangladesh. The experiment was laid out in a factorial Randomized Complete Block Design with four replications. Four levels of P viz. 0, 50, 75 and 100% of the recommended dose were applied with or without AM inoculation in order to see whether AM strain could reduce the amount of P application. There were eight treatment combinations viz. T1: 0%P - AM, T2: 50%P - AM, T3: 75%P - AM, T4: 100%P - AM, T5: 0%P + AM, T6: 50%P + AM, T7: 75%P + AM and T8: 100%P + AM. The tested crop was BARI Begun-8. The unit plot measured 2 m × 3 m. Soil based AM inoculums were used in seed bed for producing brinjal seedlings containing about 200 spores per 100 g soil and infected root pieces of the host plant was used at the rate of 1 kg m2 in seed bed. A layer of AM inoculum (*Glomus mosseae)* was firstly placed in each bed and was covered with a thin soil layer of 1 cm. Seeds were sown in seed bed and transplanted after 30 days in the field. The physical and chemical properties of the soil of seed bed and initial soil samples at a depth of 0-15 cm from the experimental fields were collected and analyzed following standard methods and presented in Tables 1 and 2.

Recommended fertilizer doses for brinjal: $N_{160}P_{30}K_{75}S_{13.5}Zn_{1.5}B_{0.8}$ kg ha^{-1} and CD-5 t ha^{-1} were used [13]. All P, K, S, Zn, B and $^{1}/_{3}{}^{rd}$ amount urea-N were applied at the time of final land preparation and the remaining $^{2}/_{3}{}^{rd}$ amount of urea-N were applied in two equal installments at 25 and 45 days of transplanting. All the intercultural operations such as irrigation, sticking, weeding, insect control etc. were done as and when necessary.

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Collection of data : root dry weight (g $plant^{-1}$), shoot dry weight (g $plant^{-1}$), plant height (cm), no. of fruit (plant-1), fruit length (cm), fruit weight (g $fruit^{-1}$), fruit yield (kg $plant^{-1}$), brinjal yield (tha^{-1}).

2.1 Statistical Analysis

Collected data were statistically analyzed using MSTAT-C computer package programme. Difference between treatments was assessed by Duncan's Multiple Range Test at 5% level of significance [14].

3. RESULTS

The effect of mycorrhizal inoculation on root colonization, number of AM spore, yield and yield contributing characters were presented in Tables 3 and 4, and Figs. 1 to 4.

Mycorrhizal inoculation significantly increased shoot dry weight (406.2 g plant-1), plant height (80.2 cm), root colonization (28.9%) and number of AM spore (128.3 per 100 g soil) in 2016-2017 (Table 3 and Figs. 1 and 3). But in 2017-2018, all the morphological parameters were accelerated significantly with AM inoculation such as root and shoot dry weight (13.57, 365.4g (30.0%) and number of AM spore (98.9 per 100 g soil) (Table 4, and Figs. 4 and 5).

Table 3. Effect of arbuscular mycorrhizal inoculant on dry matter production and plant height of brinjal

Mycorrhizal Inoculants	Root dry weight (g $plant^{-1}$)	Shoot dry weight (g $plant^{-1}$)	Plant height (cm)
2016-2017			
Uninoculated	10.73	398.9b	78.4b
Inoculated	12.10	406.2a	80.2a
SE(±)	0.50	0.15	0.46
Level of significant	NS	**	**
2017-2018			
Uninoculated	10.40b	363.1b	74.0b
Inoculated	13.57a	365.4a	76.9a
SE(±)	0.23	0.64	0.57
Level of significant	**	*	**

***Significant at 1% level, *Significant at 5% level, NS= Not significant*

Table 4. Effect of mycorrhizal inoculant on yield and yield attributes of brinjal

Mycorrhizal Inoculants	No. of fruit (plant^{-1})	Fruit length (cm)	Fruit weight (g fruit^{-1})	Fruit yield (kg plant^{-1})	Brinjal yield (t ha^{-1})
2016-2017					
Uninoculated	19.1b	22.5	70.1b	1.42b	21.4b
Inoculated	21.7a	23.4	76.8a	1.68a	24.9a
SE(±)	0.62	0.38	1.24	0.05	0.76
Level of significant	**	NS	**	**	**
2017-2018					
Uninoculated	20.8b	24.5	100.1b	1.48b	23.9b
Inoculated	23.1a	25.6	106.6a	1.67a	27.4a
SE(±)	0.17	0.48	0.46	0.03	0.32
Level of significant	**	NS	**	**	**

***Significant at 1% level, NS= Not significant*

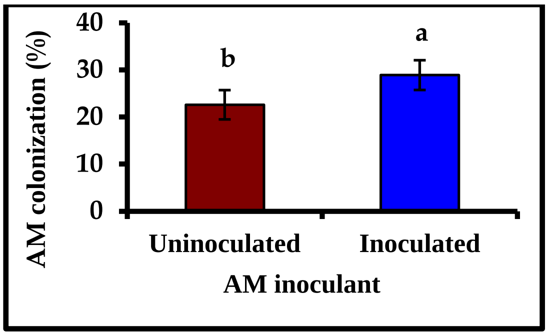

Fig. 1. Effect of AM inoculant on root colonization of brinjal during 2016-2017

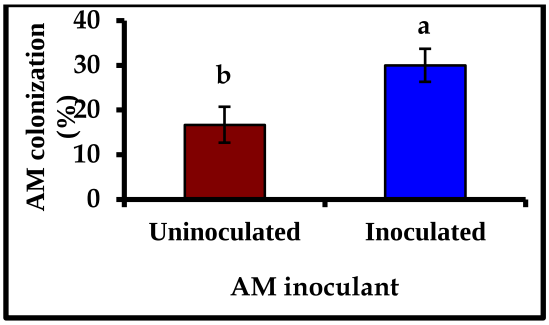

Fig. 2. Effect of AM inoculant on root colonization of brinjal during 2017-2018

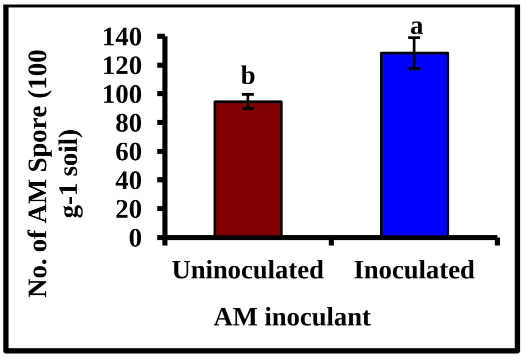

Fig. 3. Effect of AM inoculant on spore population of brinjal during 2016-2017

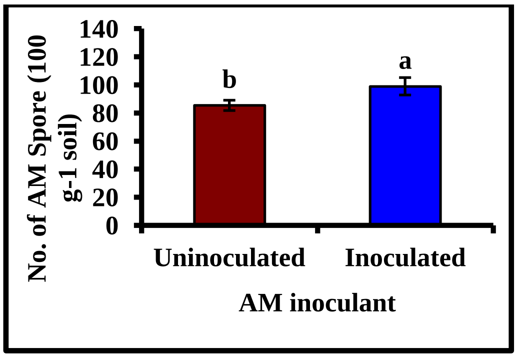

Fig. 4. Effect of AM inoculant on spore population of brinjal during 2017-2018

Yield and yield attributes were significantly influenced by AM inoculation except fruit length in both the seasons. AM inoculation was found to accelerate yield attributes such as number of fruit plant^{-1} (21.7), fruit weight (76.8 g fruit^{-1}), fruit yield (1.68 kg plant^{-1}) and brinjal yield (24.9 t ha^{-1}) in 2015-2016. In 2017-2018, higher performances were also observed in most of the characters such as number of fruit (23.1 plant^{-1}), fruit weight (106.6 g fruit^{-1}), fruit yield (1.67 kg plant-1) and brinjal yield (27.4 t ha^{-1}). Such increase in yield and yield attributes might be due to higher AM root colonization and AM spore population leading to higherP uptake.

3.1 Effect of Phosphorus

Morphological parameters were significantly influenced by P application (Table 5 and Figs. 5 to 8). The highest root dry weight (12.8 g plant) and plant height (80.8 cm) were observed with 100% P that was identical with 75% P. Shoot dry weight (412.9 g plant^{-1}) were recorded maximum with 100% P and number of AM spore (121.1 per 100 g soil) were recorded maximum with 75% P. Root colonization was recorded the highest percentage (31.0%) with 75% P which was identical with 100% P in 2016-2017. In 2017-2018, all the morphological parameters such as root and shoot dry weight (14.1 and 367.5g plant^{-1}), plant height (78.4 cm) and root colonization (27.6%) showed better performance with 100% P. The number of AM spore (99.0 100g soil^{-1}) performed better with 75% P, among them root length, shoot dry weight, plant height and root colonization were statistically similar with 75% P.

All the yield attributes were highly significant with P application in both season except fruit weight in 2015-2016 (Table 6). The highest number of fruit plant-1 (23.5), fruit length (23.8 cm), fruit yield (1.76 kg plant^{-1}) and brinjal yield (26.7 t ha^{-1}) were obtained with 100% P that were identical with 75% P. In 2016-2017, all the parameters showed better performances with 100% P such as number of fruit plant-1 (24.8), fruit length (27.3 cm), fruit weight (104.8 g fruit-1), fruit yield (1.94kg plant^{-1}), among them all traits were identical with 75% P except number of fruit plant^{-1}, fruit yield and total yield.

Table 5. Effect of P on dry matter production and plant height of brinjal

Phosphorus level	Root dry weight (g plant^{-1})	Shoot dry weight (g plant^{-1})	Plant height (cm)
2016-2017			
0% P	9.5b	387.4d	75.7b
50% P	11.2ab	400.0c	80.1a
75% P	12.2a	410.1b	80.5a
100% P	12.8a	412.9a	80.8a
SE(±)	0.71	0.22	0.65
Level of significant	*	**	**
2017-2018			
0% P	10.1c	358.4c	71.5c
50% P	11.4b	364.4b	74.6b
75% P	12.3b	366.7ab	77.3a
100% P	14.1a	367.5a	78.4a
SE(±)	0.33	0.90	0.81
Level of significant	**	**	**

*P= Phosphorus; Means followed by common letter are not significantly different at 5% level by DMRT; **Significant at 1% level, *Significant at 5% level*

Table 6. Effect of P on yield and yield attributes of brinjal

Phosphorus level	No. of fruit plant^{-1}	Fruit length (cm)	Fruit weight (g fruit^{-1})	Fruit yield (kg plant^{-1})	Brinjal yield (t ha^{-1})
2016-2017					
0% P	17.8b	21.4b	70.8	1.26b	18.9c
50% P	18.5b	23.1a	73.3	1.45b	21.8bc
75% P	22.0a	23.5a	74.4	1.70a	24.9ab
100%P	23.5a	23.8a	75.3	1.76a	26.7a
SE(±)	0.87	0.54	1.76	0.07	1.08
Level of significant	**	*	NS	**	**
2017-2018					
0% P	17.6d	21.7c	100.8b	1.24c	20.4d
50% P	21.8c	25.1b	103.3a	1.38c	25.1c
75% P	23.5b	26.1ab	104.6a	1.75b	27.2b
100%P	24.8a	27.3a	104.8a	1.94a	30.1a
SE(±)	0.24	0.68	0.65	0.05	0.45
Level of significant	**	**	**	**	**

*P= Phosphorus; Means followed by common letter are not significantly different at 5% level by DMRT; **Significant at 1% level, *Significant at 5% level, NS= Not significant*

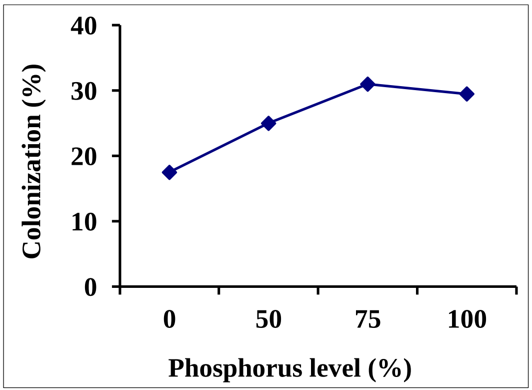

Fig. 5. Effect of phosphorus on root colonization of brinjal during 2016-2017

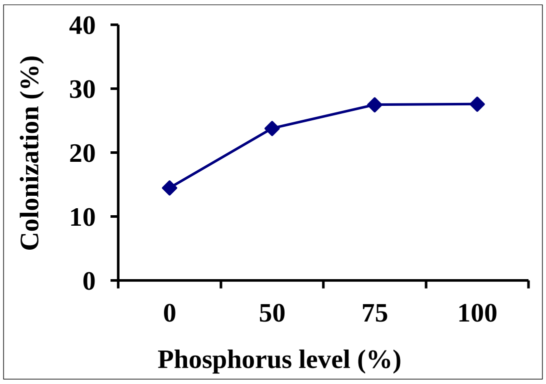

Fig. 6. Effect of phosphorus on root colonization of brinjal during 2017-2018

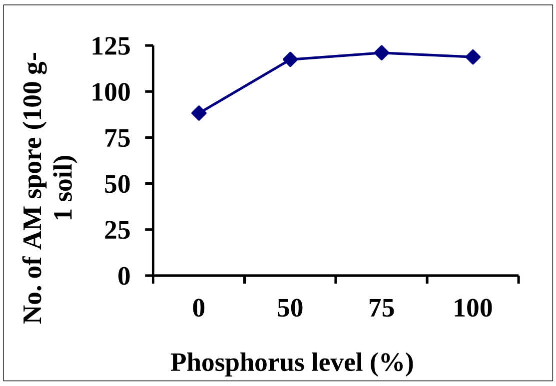

Fig. 7. Effect of phosphorus on spore population of brinjal during 2016-2017

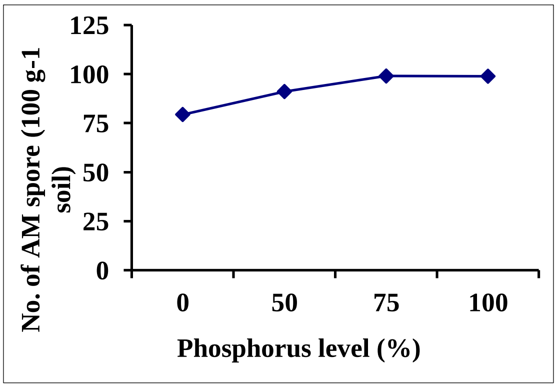

Fig. 8. Effect of phosphorus on spore population of brinjal during 2017-2018

3.2 Interaction Effect of Mycorrhizal Inoculation and Phosphorus

Interaction effect showed significant differences in some parameters such as shoot dry weight, root colonization and number of AM spore but insignificant variation were observed in root dry weight and plant height in 2016-2017 (Table 7). Cent per cent P with AM increased root dry weight (13.3 g plant^{-1}) and shoot dry weight (415.4g plant^{-1}) which was identical with 75% P plus AM. But 75% P with AM accelerated root colonization (34.8%) and number of AM spore (142.5 per 100 g soil). In 2016-2017 all the parameters were insignificant except root dry weight, root colonization and number of AM spore. Full dose of P with AM increased all the parameters such as root dry weight (14.8 g plant^{-1}), shoot dry weight (368.2 g plant^{-1}) and plant height (79.1 cm). 75% P with AM increased root colonization (35%) and number of AM spore (106.9 per 100 g soil) which was identical with 100% P with AM.

No significant differences were observed in yield and yield attributes with the interaction of P and mycorrhizal inoculation in 2016-2017 except number of fruits plant-1, fruit yield and brinjal yield in 2017-2018 (Table 8). But 100% P with AM showed increased effect in all cases such as number of fruit plant-1 (25.5), fruit length (24 cm), fruit weight (78.8 g fruit^{-1}), fruit yield (1.96 kg plant^{-1}) and brinjal yield (29.3 t ha^{-1}). In 2016-2017, 100% P with AM increased all yield attributes such as number of fruit plant^{-1} (25.3), fruit length (27.6 cm), fruit weight (107.8 g fruit), fruit yield (1.99 kg plant^{-1}) and brinjal yield (30.8 t ha-1). Number of fruit plant^{-1} were identical with 75% P along with AM. But fruit yield and total yield were identical with 75% P with AM and 100% P.

No significant changes in yield contributing characters were observed between 75% P with AM and 100% P. That indicated that mycorrhizal inoculation in nursery bed could save 25% P fertilizer for brinjal cultivation. Those plants which did not receive AM in nursery bed performed less in the field at all P levels. Per cent yield increase in brinjal were 34.07% and 38.57% in 2015-2016 with 75% P and 100% P along with AM. On the other hand, per cent yield increase in brinjal were 35.64% and 36.69% with 75% P and 100% P along with AM in 2017-2018 over control.

Table 7. Interaction effect of P and mycorrhizal inoculants on dry matter production, plant height, root colonization and spore population of brinjal

Treatment	Root dry weight (g plant^{-1})	Shoot dry weight (g plant^{-1})	Plant height (cm)	Root colonization (%)	No. of AM spore (100g soil^{-1})
2016-2017					
0% P – AM	9.0	385.3f	73.2	15.0f	80.0e
50% P – AM	10.3	395.0f	79.6	20.0e	98.8cd
75% P – AM	11.4	405.1c	80.0	27.3d	99.8c
100%P – AM	12.3	410.1b	80.6	28.0cd	99.9c
0% P + AM	10.0	389.4e	78.3	20.0e	96.5d
50% P + AM	12.2	405.0c	80.5	30.0bc	136.3b
75% P + AM	13.0	415.1a	81.0	34.8a	142.5a
100% P + AM	13.3	415.4a	81.0	31.0b	137.8b
SE(±)	1.0	0.31	0.92	0.86	0.83
Level of sig.	NS	**	NS	**	**
CV (%)	17.5	12.2	12.3	6.7	11.5
2017-2018					
0% P – AM	8.0e	356.3	70.3	10.0d	78.8d
50% P – AM	9.6d	363.5	72.2	15.0c	79.2d
75% P – AM	10.6d	365.8	75.7	20.0b	91.2c
100%P – AM	13.4a-c	366.8	77.8	21.8b	92.2c
0% P + AM	12.1c	360.5	72.7	19.0b	80.0d
50% P + AM	13.2bc	365.3	76.9	32.5a	103.0b
75% P + AM	14.1ab	367.7	78.9	35.0a	106.9a
100% P + AM	14.8a	368.2	79.1	33.5a	106.8a
SE(±)	0.46	1.28	1.14	1.16	0.87
Level of sig.	*	NS	NS	**	**
CV (%)	7.7	12.7	13.0	10.0	11.9

P= Phosphorus
AM = Arbuscular Mycorrhiza
Means followed by common letter are not significantly different at 5% level by DMRT
***Significant at 1% level, *Significant at 5% level, NS= Not significant*

Table 8. Interaction effect of P and mycorrhizal inoculants on yield attributes and yield of brinjal

Treatment	No. of fruit plant-1	Fruit length (cm)	Fruit weight (g fruit-1)	Fruit yield (kg plant-1)	Brinjal yield (t ha-1)	Per cent yield increase over control
2016-2017						
0% P – AM	17.0	20.5	67.5	1.20	18.0	-
50% P – AM	19.0	22.7	70.0	1.38	20.8	13.46
75% P – AM	19.1	23.0	71.0	1.51	22.6	20.35
100%P – AM	21.5	23.6	71.8	1.61	24.1	25.31
0% P + AM	18.5	22.2	74.0	1.33	19.9	9.55
50% P + AM	18.0	23.4	76.5	1.53	22.9	21.39
75% P + AM	25.0	24.0	77.8	1.90	27.3	34.07
100% P + AM	25.5	24.0	78.8	1.96	29.3	38.57
SE(±)	1.24	0.76	2.49	0.10	1.52	
Level of sig.	NS	NS	NS	NS	NS	

Treatment	No. of fruit plant-1	Fruit length (cm)	Fruit weight (g fruit-1)	Fruit yield (kg plant-1)	Brinjal yield (t ha-1)	Per cent yield increase over control
CV (%)	12.1	6.7	6.8	13.1	13.2	
2017-2018						
0% P – AM	17.3f	21.1	97.5	1.23c	19.5e	-
50% P – AM	19.6e	24.9	100.0	1.36c	22.9d	14.85
75% P – AM	21.9d	25.2	101.0	1.55b	24.1c	19.09
100%P – AM	24.3bc	26.9	101.8	1.89a	29.3a	33.45
0% P + AM	18.0f	22.4	104.0	1.25c	21.3de	8.45
50% P + AM	23.9c	25.3	106.5	1.50b	27.4b	28.83
75% P + AM	25.2ab	27.0	108.3	1.96a	30.3a	35.64
100% P + AM	25.3a	27.6	107.8	1.99a	30.8a	36.69
SE(±)	0.33	0.96	0.91	0.07	0.64	
Level of sig.	**	NS	NS	*	**	
CV (%)	3.05	7.7	12.0	8.8	5.0	

P= Phosphorus
AM = Arbuscular Mycorrhiza
Means followed by common letter are not significantly different at 5% level by DMRT
***Significant at 1% level, *Significant at 5% level, NS= Not significant*

4. DISCUSSION

Four levels of P viz. 0, 50, 75 and 100% of the recommended dose were applied with or without AM inoculation in order to see whether AM strain could reduce the amount of P application.

Most of the yield contributing characters found to be increased significantly with AM inoculation such as number of fruit, fruit weight, fruit yield plant-1 and total yield t ha-1 in both the seasons. Higher AM root colonization and AM spore population leading to higher P uptake could be the reason behind such increase [15,16], and [11]. Root colonization with mycorrhizal inoculation in *Solanum* species were also mentioned in the study of [17] and [18].

Application of P also influenced all the parameters under study significantly in both years except fruit weight in 2015-16. Most cases, the highest values were obtained from 100% P, which were statistically similar to 75% P in many parameters. [17] also found similar result.

Interaction effect showed only root colonization and number of AM spore were significant in both years, while only shoot dry weight in 2016-17 and root dry weight, number of fruits, fruit yield and total yield were significant in 2017-18. In latter year, the highest fruit yield and total yield were recorded with 100% P with AM which also similar with 75% P along with AM and 100% P without AM. It indicated 25% P was saved. A similar trend of saving of P was also cited in the study of [15].

5. CONCLUSION

The root colonization was increased by 28.9% and 30.0% in 2016-2017 and 2017-2018 respectively due to the influence of arbuscular mycorrhiza that helped to increase in higher P uptake. The AM inoculation significantly increased most of the yield and yield contributing characters such as number of fruit plant-1, fruit volume, fruit weight, fruit yield and brinjal yield in both seasons. The 75% P treatment showed maximum root colonization percentage which significantly differed from all other doses of P except 100% P in 2016-2017. In 2017-2018, all the morphological parameters such as root and shoot dry weight, plant height, root colonization and number of AM spore showed better performances with 100% P. Among them root length, shoot dry weight, plant height, root colonization and number of AM spore were statistically similar to that of 75% P. In both seasons no significant differences were also observed in fruit yield and total yield with 75% P with AM and 100% P. This was also an indication of saving P fertilizer in nursery bed due to AM inoculation. Per cent yield increase in brinjal were 34.07%- 35.64% with 75% P along with AM in 2016-2017 and 2017-2018 over control.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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