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Influence of *Glomus fasciculatum* and Bioformulations on In-situ Grafting of Jamun (*Syzygium cuminii* Skeels)

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ABSTRACT

An experiment was conducted at Horticulture Research station, Bijapur (Tidagundi) to know the influence of Glomus fasciculatum and bioformulations on germination, graft-take and graft survival of jamun under in-situ condition. Seeds inoculated with Glomus fasciculatum recorded highest germination percentage (51.66%), graft-take (31.55%) and graft survival (30.93%) compared to uninoculated seeds. Among different bioformulations, seeds inoculated with microbial consortia registered highest germination percentage (54.85%) and graft-take (32.76%) whereas highest graft survival (34.84%) was recorded by panchagavya compared to untreated control.

Key words: *Syzygium cuminii, In-situ grafting, Glomus fasciculatum, Bioformulations*

INTRODUCTION

Jamun (*Syzygium cuminii* Skeels) is an important, under exploited, indigenous fruit crop of our country. It belongs to family Myrtaceae. It has gained tremendous importance and recognition in recent past because of its hardy nature, uncomparable medicinal and nutritional properties. The seed powder has antidiabetic properties and is a lotion for the cure of ringworm[5]. It is good source of Iron apart from minerals, sugar, proteins, pigments etc[10]. The fruit is tasty, pleasant flavored and are very much liked by the masses of people and mostly used for dessert purpose and also for preparation of delicious beverages, Jellies, Jam, Squash, Wine, Vinegar and Pickles[7].

Tree produces a large quantity of seeds, and freshly extracted seeds germinate up to 75 per cent. Seeds are recalcitrant and lose viability fast due to its smallest size and thin seed coat. Fruits are highly season specific in availability and duration is also short. Thus, increasing per cent germination and graft success within a stipulated time period with inoculation of *Glomus fasciculatum* and bioformulations is of utmost importance.

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On the other hand, *in-situ* grafting (new dry land technology) is best method of propagation for better establishment in dry land and less damage to grafts with no question of transplanting to main field. Therefore, to enhance highest germination percentage, higher graft success and better survival in the main field the present study was undertaken.

MATERIAL AND METHODS

An investigation was carried out at Horticulture Research station, Bijapur (Tidagundi) to know the combined influence of *Glomus fasciculatum* and bioformulations on germination and graft take of jamun in main field (*in-situ)*. The experiment consisting of 10 treatment combinations with two main plots (M_1- with *Glomus fasciculatum*, M_2- Un inoculated) and five sub plots (S_1- Amrit pani, S_2- Microbial consortia, S_3- Panchagavya, S_4- Inorganic fertilizer (60:30:90 gram N: P: K per plant per year), S_5- Control) was laid out in split plot design with three replications. The non-descriptive uniform size jamun seeds obtained from a single tree in the farmer field of soundatti were sown in the main field at 10X10m spacing of 6 seeds per pit. AM fungi inoculation was done by spreading five grams of inoculum uniformly at five centimetre depth after putting a thin layer of soil on the inoculum. Jamun seeds were placed and covered with soil (2-3 cm). The bioformulations were applied as soil application at three per cent at monthly interval and watered daily. Weeding and other cultural operations were done as and when required.

Bioformulations like Amrit pani, microbial consortia and panchagavya were prepared and used. Amrit pani is a mixture of Ten kilograms of cow dung and 250 g cow ghee were mixed properly. To this mixture, 500 g of honey was added and mixed thoroughly. This mixture was kept for incubation of 24 hours[8], before use. Microbial consortium consisted of 15 local isolates of bacteria, fungi and actinomycetes comprising of bioinoculants, PGPRs and biocontrol agents in cow dung slurry. Whereas panchagavya was prepared with Seven kilograms of fresh cow dung and one kilogram of fresh cow ghee were mixed thoroughly and incubated for two days. On the third day, three litres of cow urine and 10 litres of water were added to the above mixture and kept for incubation. After 15 days of incubation, three litres of sugarcane juice, two litres of cow milk, two litres of cow curd, three litres of tender coconut water and 12 ripe bananas were added and mixed thoroughly. This mixture was again kept for 15 days for incubation and then used[8].

RESULTS AND DISCUSSION

Seeds that were inoculated with *Glomus fasciculatum* germinated early and took minimum days (45.40) for 50 per cent germination and also recorded highest germination per cent (51.66%), graft-take (31.55%), graft survival (30.93%), increased spore count (693.67) and highest root colonization (86.80) compared to uninoculated control.

Among different bioformulations, seeds that were inoculated with microbial consortia registered highest germination per cent (54.85%), graft-take (32.76%), spore count (402.17) and root colonization (65.50) whereas highest graft survival (34.84%) was recorded by panchagavya compared to control.

Interaction effects found to be non-significant for 50 per cent, completion of germination and root colonization. Seeds that are supplied with *Glomus fasciculatum* in combination with microbial consortia and *Glomus fasciculatum* in combination with panchagavya recorded highest germination per cent (55.55% each), seeds supplied with *Glomus fasciculatum* in combination with microbial consortia registered highest graft success (34.28%) and highest spore count (712.33) whereas highest graft survival (36.30%) was recorded in the treatment supplied with *Glomus fasciculatum* in combination with panchagavya.

In the present study, seeds inoculated with *Glomus fasciculatum* attained early germination compared to control of the uninoculated seeds. This is because of the fact

that AM fungi secrete plant growth regulators like gibberellins[1], which are known to increase germination percentage[4]. Increased germination due to AM fungal inoculation was also reported in citrus[12,2], mango[9,3], aonla[11], and in jamun[6].

Bioformulations are richest source of micro organisms especially plant growth promoting rhizobacteria (PGPR) or plant health promoting rhizobacteria (PHPR) which are important ones in enhancing germination, graft take and graft survival and better establish in the main field. Microbial consortia comprising of 15 organisms such as nitrogen fixers, bioinoculants, PGPR's and bio-control agents which helps in early germination.

Higher germination, graft success, graft survival as observed in the present investigation may also attributed due to efficient root colonization by *Glomus fasciculatum* that had established well in the rhizosphere. Further, presence of chlamydospores in the rhizosphere of jamun plants might promoted AM fungal infection. Hence, there was more spore count and increased root colonization (Table 3).

Table 1: Influence of *Glomus fasciculatum* and bioformulations on days taken to germination and germination percentage of Jamun under *in-situ* condition

Treatments	Days taken for germination												Germination (%)					
	50% Germination						Complete Germination											
	S_1	S_2	S_3	S_4	S_5	mean	S_1	S_2	S_3	S_4	S_5	mean	S_1	S_2	S_3	S_4	S_5	mean
M_1	45.33	43.67	44.67	46.33	47.00	45.40	69.00	67.33	66.33	70.00	71.67	68.87	54.16 (47.35)	55.55 (48.16)	55.55 (48.16)	51.38 (45.75)	41.66 (40.16)	51.66 (45.92)
M_2	47.67	46.33	47.00	47.00	48.33	47.27	71.33	69.00	70.00	72.33	73.67	71.27	51.38 (45.75)	54.16 (47.35)	52.77 (46.55)	48.61 (44.20)	41.66 (40.16)	49.71 (44.80)
mean	46.50	45.00	45.83	46.67	47.67		70.17	68.17	68.17	71.17	72.67		52.77 (46.55)	54.85 (47.76)	54.16 (47.36)	49.99 (44.98)	41.66 (40.16)	
For comparing the means of	S. Em±		CD at 5%		CD at 1%		S. Em±		CD at 5%		CD at 1%		S. Em±		CD at 5%		CD at 1%	
M	0.21		1.25		2.88		1.07		NS		NS		0.05		0.31		0.72	
S	0.89		NS		NS		1.13		NS		NS		0.11		0.34		0.46	
S at same M	1.26		NS		NS		1.59		NS		NS		0.16		0.48		0.65	
M at same S	1.15		NS		NS		1.78		NS		NS		0.15		0.45		0.62	

M_1- *Glomus fasciculatum* M_2- Un inoculated S_1- Amrit pani S_2- Microbial Consortia S_3- Panchagavya S_4- RDF S_5- Control
Figures in parenthesis pertains to the angular transformation of data
NS- Non-significant

Table 2: Influence of *Glomus fasciculatum* and bioformulations on graft success and survival percentage of Jamun under *in-situ* grown Stocks

Treatments	Graft success (%)						Survival (%)					
	S_1	S_2	S_3	S_4	S_5	mean	S_1	S_2	S_3	S_4	S_5	mean
M_1	32.25 (34.57)	34.28 (35.79)	32.35 (34.63)	32.25 (34.57)	26.66 (31.05)	31.55 (34.12)	30.00 (33.21)	33.33 (35.24)	36.30 (37.05)	30.00 (33.21)	25.00 (30.00)	30.93 (33.74)
M_2	28.00 (31.95)	31.25 (33.96)	30.00 (33.21)	28.57 (32.27)	24.00 (29.33)	28.36 (32.14)	28.57 (32.27)	30.00 (33.21)	33.33 (35.24)	28.57 (32.27)	16.66 (24.04)	27.42 (31.41)
Mean	30.12 (33.26)	32.76 (34.88)	31.17 (33.92)	30.41 (33.42)	25.33 (30.19)		29.28 (32.74)	31.66 (34.23)	34.84 (36.15)	29.28 (32.74)	20.83 (27.02)	
For comparing the means of	S. Em±		CD at 5%		CD at 1%		S. Em±		CD at 5%		CD at 1%	
M	0.08		0.48		1.11		0.05		0.32		0.74	
S	0.12		0.35		0.48		0.05		0.16		0.23	
S at same M	0.17		0.50		NS		0.08		0.23		0.32	
M at same S	0.17		0.50		NS		0.09		0.26		0.36	

M_1- *Glomus fasciculatum* M_2- Un inoculated S_1- Amrit pani S_2- microbial consortia S_3- Panchagavya S_4- RDF S_5-Control
NS-Non-significant
Figures in parenthesis pertains to the angular transformation of data

Table 3: Influence of *Glomus fasciculatum* and bioformulations on spore count and root colonization of Jamun under *in-situ* grown stocks

Treatments	Spore count											
	90 DAS						180 DAS					
	S_1	S_2	S_3	S_4	S_5	mean	S_1	S_2	S_3	S_4	S_5	mean
M_1	682.67	695.67	686.67	671.67	662.00	679.73	692.67	712.33	700.67	688.67	674.00	693.67
M_2	83.67	87.67	85.00	74.67	69.00	80.00	87.00	92.00	90.00	78.67	71.00	83.73
Mean	383.17	391.67	385.83	373.17	365.50		389.83	402.17	395.33	383.67	372.50	
For comparing the means of	S. Em±		CD at 5%		CD at 1%		S Em±		CD at 5%		CD at 1%	
M	0.54		3.31		7.63		0.33		2.01		4.63	
S	0.99		2.96		4.07		1.09		3.26		4.49	
S at same M	1.39		4.18		5.76		1.54		4.61		6.35	
M at same S	1.36		4.08		5.62		1.41		4.24		5.84	
Treatments	Root colonization											
	90 DAS						180 DAS					
	S_1	S_2	S_3	S_4	S_5	mean	S_1	S_2	S_3	S_4	S_5	mean
M_1	82.00	85.00	84.00	79.00	76.00	81.20	87.00	90.00	88.00	85.00	84.00	86.80
M_2	34.00	36.00	35.00	32.00	30.00	33.40	38.00	41.00	39.00	37.00	34.00	37.80
Mean	58.00	60.50	59.50	55.50	53.00		62.50	65.50	63.50	61.00	59.00	
For comparing the means of	S Em±		CD at 5%		CD at 1%		S Em±		CD at 5%		CD at 1%	
M	0.24		1.49		3.44		0.22		1.31		3.03	
S	0.85		2.56		3.53		0.66		1.99		2.75	
S at same M	1.21		NS		NS		0.94		NS		NS	
M at same S	1.11		NS		NS		0.87		NS		NS	

M_1- *Glomus fasciculatum* M_2- Un inoculated S_1- Amrit pani S_2- Microbial Consortia S_3- Panchagavya S_4- RDF S_5- Control
NS-Non-significant
DAS- Days after sowing

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