RESEARCH ARTICLE

Influence of VAM (*Glomus fasciculum*) on Vegetative and Reproductive Parameters of *Cassia tora* Linn.

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ABSTRACT

Cassia tora Linn. is well known weed found throughout Maharashtra. It a well known medicinal plant used in various skin disorders. *Cassia tora* L. is commonly known as 'Takala' in Marathi and tender leaves are used as vegetable in Konkan region. Investigation was carried out to study influence of VAM on vegetative and reproductive parameters after inoculation. After 90 days growth parameters like plant height, number of branches, number of flowers, number of fruits, dry leaf biomass, dry root biomass, mycorrhizal colonization, % VAM Colonization, was quantified. Plant with either a combination of mycorrhizal fungi and phosphorous grew taller and produced higher dry matter of root and leaf than treated with phosphorous alone or control plants. Number of branches increased when inoculated with mycorrhizal fungi and phosphorous. In the present study mycorrhizal fungi and phosphorous were found to be synergistic with percent of root colonization.

Key words- VAM, *Cassia tora* L., productivity

INTRODUCTION

The AM fungal association is a major connection between the soil and the plant. They play an important role in the uptake of nutrients and water. VAM are known to enhance plant biomass through better uptake of nutrients, water relations, resistant to drought and increased tolerance to plant pathogens Bagyaraj et al., 1980. Studies indicate that plants shows response to inoculation with efficient strain of VAM. The present paper aims at the effect of *Glomus fasciculatum* inoculation on vegetative and reproductive parameters in *Cassia tora* L. It is an annual foetid herb. It is mainly found in the states of Uttar Pradesh and Madhya Pradesh and Maharashtra in India. It has pinnate leaves. Each leaf has three pairs of leaflets that are opposite, ovate, oblong and oblique at the base. The yellow coloured flowers are bearded in the axils of the leaves. The flowers comprises of five petals. The seeds are rhomboidal and brown in colour. The *Cassia tora* L. is also known as

Charota an Chakvad in Hindi, Chakunda in Bengali and Oriya, Kawaria in Gujarati, Chakramandrakam in Malayalam, Takala in Marathi, Chakramarda & Dadmari in Sanskrit, Tagarai in Tamil and Chinnakasinda in Telugu. *Cassia tora* L. is used as a coffee substitute. It is very useful in treating skin diseases like ringworm and itching or body scratch and psoriasis. Decoction of the fruit of *Cassia tora* L. is used in the treatment of fever. Since the herb acts as a kapha and vata dosha suppressant, it acts as a nerve tonic. *Cassia tora* L. acts as a liver stimulant, mild laxative and heart tonic. The herb helps the body in maintaining the normal level of cholesterol. *Cassia tora* L. is used for treating piles. Its powder proves useful in combating indigestion, toning up heart muscles and purifying blood. The leaves are useful in leprosy, flatulence, colic, dyspepsia, constipation, cough, bronchitis and cardiac disorders. (http://www.iloveindia.com/indian-herbs/cassia-tora.html)

MATERIALS AND METHODS

Matured healthy seeds of *Cassia tora* L. were collect from Narayangaon, Taluka- Junnar, Dist- Pune, Maharashtra. Earthen pots with 25cm diameter and depth and with proper drainage were selected for planting filled with 3Kg of sterilized soil mixture containing Sand: Soil: FYM in 1:2:1 proportion. Pots were place in sunlight and watered till the capacity a day before planting. Further they were watered till the field capacity on alternate days for 60 days of growth. Phosphate was added at different levels as suggested in various treatments. In all there were six sets with six treatments in sterilized soil. The results were based on three replication of each treatment.

Treatments

Flowing sets of treatments were maintained as Control, un-inoculated, without phosphate & VAM, VAM Inoculated, without phosphate, VAM un-inoculated with 1gm phosphate per pot, VAM Inoculated with 1gm phosphate per pot, VAM Inoculated with 0.75gm phosphate per pot, VAM Inoculated with 0.50gm phosphate per pot. Same sets were made for non sterilized soil. One plant from each replicate was harvested at the end of sixty days for recording observations. Plants were removed carefully along with the roots. Roots were carefully and fixed with in F.A.A. for 24 hours. AM Fungal spores were recovered by the wet sieving and decanting technique (Gerdeman and Nicolson, 1963). Selected AM fungal spores were mounted in polyvinyl alcohol lacto phenol and identified using Schenck. Percentage VAM colonization was estimated using formula.

$$\text{\% VAM Colonization} = \frac{\text{No. of Mycorrhizal root segment}}{\text{Total no. of. Root segment screened}} \text{X } 100$$

Further observation was recorded at flowering and fruiting period for reproductive parameters. Dry biomass of shoot and root was recorded after 60 days.

RESULTS AND DISCUSSION

All quantitative parameter showed a remarkable increase in their values for sets inoculated with phosphate and inoculated alone over the values of control. Results from given tables also show that non sterilized soil is more reliable than sterilized soil for establishment of symbiotic association of VAM and the host plants. Similar results are reported for enhanced plant growth due to AM inoculation to medicinal

Table 1: Growth performance of *Cassia tora* L. in response to various levels of phosphate, and VAM in non sterilized soil.

Soil type	**Non sterilized**					
Set	I	II	III	IV	V	VI
Treatments	UP00	IP00	UP100	IP100	IP75	IP50
Parameters	*	*	*	*	*	*
Plant height (cm.)	30.1 ± 0.1	31.2 ± 0	33.02 ± 0.2	40.04 ± 0.1	35.51 ± 1 .02	26.31 ± 1.01
No. of Branches/plant	2.01 ± 0.1	3.02 ± 00	4.06±0.47	5.15±0.81	5.00±0.94	4.25±0.47
No. of flowers /plant	11	12	15	19	15	12
Leaf dry biomass (gm)	0.20	0.26	0.55	1.90	1.50	1.51
Root dry biomass (gm)	0.35	0.41	0.49	0.50	0.46	0.42
% VAM Colonization	00	22.3	00	33	23.3	22.3
Spore count (Per 50 gm of soil)	00	15	00	26	32	33

Table 2: Growth performance of *Cassia tora* L. in response to various levels of phosphate, and VAM in sterilized soil.

Soil type	**Sterilized**					
Set	I	II	III	IV	V	VI
Treatments	UP00	IP00	UP100	IP100	IP75	IP50
Parameters	*	*	*	*	*	*
Plant height (cm.)	30.15 ± 01	29.10 ± 02	31.03 ± 1.22	37.04 ± 1.12	33.54 ± 1 .39	24.22 ± 1.1
No. of Branches/plant	2.01 ± 0.1	2.06 ± 00	3.16±0.47	4.56±0.81	4.12±0.94	3.34±0.4
No. of flowers /plant	10	11	14	17	13	10
Leaf dry biomass (gm)	0.19	0.22	0.45	1.00	1.20	1.1
Root dry biomass (gm)	0.25	0.21	0.39	0.40	0.36	0.32
% VAM Colonization	00	21.2	00	31	21.4	20.1
Spore count (Per 50 gm of soil)	00	12	00	21	28	24

UP00 (Control, un-inoculated, without phosphate & VAM). **IP00** (VAM Inoculated, without phosphate). **UP100** (VAM un-inoculated with 1gm phosphate per pot). **IP100** (VAM Inoculated with 1gm phosphate per pot). **IP75** (VAM Inoculated with 0.75gm phosphate per pot). **IP50** (VAM Inoculated with 0.50gm phosphate per pot) Standard deviation (SD)

plants by (Earanna, 2001; Bobby & Bagyaraj, 2003; Nisha & Rajeshkumar, 2010; Darade, 2014), on forest trees species by Vasanthakrishna *et al.,* 1995. Similar observations were made on *Vigna unguiculata* (L) Walp var. Pusa 151 by Arumugam *et al*, (2010). The plants inoculated with AM fungi showed positive AM fungi colonization in roots. Uninoculated control plants do not have colonization. VAM inoculation significantly influenced the root uptake of nutrients. The leaf uptake was not affected except for the uptake of P. In most cases, there was no difference in the nutrient concentration between inoculated and uninoculated plants, either in the leaf or in the root, indicating that the productivity of Cassia was regulated by the amount of nutrients the roots could absorb, which is reported by Osonub, *et al*., (1995) and similar findings are made in following investigation.

CONCLUSION

Effect of inoculation by symbiotic VAM on legumes growth and development depends on both biotic and abiotic factor. The success of inoculation with mycorrhiza-based biofertilizer on legumes depends on several factors including the density of inoculants in infective roots and the length of plant life cycle. Chemical fertilizers and refined soil may also be the cause to harm symbiotic association.

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