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EFFECT OF VA MYCORRHIZAE INOCULATION ON VEGETATIVE GROWTH IN PERENNIAL SOYBEAN.

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ABSTRACT:
Perennial Soybean well known as *Neonotonia wightii* (Wight & Arn.) J.A. Lackey of Fabaceae grows widely in Asian sub-continent. classified by its habit wit stem trailing and climbing with strong taproot, it has woody base and is climbing up to 10 m. Pod are brown, linear-oblong, straight sometimes slightly with curved apex, grooved and septate between the seeds. Seeds are oblong and laterally compressed, olive-green to light reddish-brown in colour. Present experiment was carried out to study effect of VAM and Phosphorous on vegetative growth parameters like height, Number of branches, and leaves per branches. Results reflected positive curve in growth parameters of Perennial soybean.

Keywords: *Perennial Soy, Neonotonia wightii, VAM.*

INTRODUCTION:

Perennial soybean, Neonotonia wightii (Wight & Arn.) J.A. Lackey is climbing and twining herbaceous legume with deep strong taproot. Though it is invasive species, it has importance as soil conditioner and weed controller. In its native habitat it is valued as forage crop for cattle, goats, sheep and other livestock. Being invasive it might be looked down but considering its nutritional value as fodder and biocontrol properties research is being carried out to improve its role in agriculture.

VAM means vesicular arbuscular mycorrhizal fungi. They improve phosphate absorption of plants which promotes growth and development. VAM grows in close association with the roots and play an important role in transfer of soil nutrients to the plant. In exchange, the plant supplies the fungus with sugars. Mycorrhizal fungi have been suggested as having a role in uptake of water at during drought stress, and heavy metals contaminated soil Courtecuisse, (1999). The hyphae of arbuscular mycorrhizal fungi penetrate roots and grow extensively between and within living cortical cells, forming a very large and dynamic interface between symbionts. The hyphae also extend from root surfaces into the surrounding soil, binding particles and increasing micro- and macro-aggregation Auge, (2001). The VAM selected for the research was *Glomus fasciculatum*.

MATERIAL AND METHODS:

Investigation was conducted at the Department of Botany, Arts, Commerce and Science College, Narayangaon, Pune to study the response of Perennial Soybean to VA mycorrhizal inoculation.

Mature healthy seeds of Perennial Soybean were collected from Khanadala (Khambatki) Dist- Satara, Maharashtra. Earthen pots with 30 cm diameter, and depth, with a hole at the base for drainage system were selected and were filled with 3 kg of sterilized soil mixture of

sand: soil: FYM in 1: 2: 1 proportion. The pots were placed in full sunlight and were watered till field capacity a day before sowing and alternate days till the final harvest. Recommended phosphate fertilizer was procured from Suryakant agro service, Kalamb added at different levels as suggested in various treatments.

In Perennial Soybean. there were five sets with five treatments in sterilized soil.

Set I – UP00 - Control, uninoculated without phosphate.

Set II – IP00 - VAM inoculated without phosphate.

Set IV – IP100% - VAM inoculated with 1gm phosphate per pot.

Set III – UP75% - Uninoculated with 0.75gm phosphate per pot.

Set IV – IP50% - VAM inoculated with 0.5 gm phosphate per pot.

The similar sets were made for non-sterilized soil also.

Ten root segments of each plant were collected and subjected for detection of mycorrhizal colonization. Identification is attempted by manual by Schenck and Perez, (1987). Frequency was calculated using the formula,

$$\% \text{ frequency of mycorrhizal colonization} = \frac{\text{Number of mycorrhizal root segments}}{\text{Total number of root segments screened}} \times 100$$

RESULTS AND DISCUSSION:

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).

The result of present investigation clearly indicates that Perennial Soybean responds well to the mycorrhizal inoculation.

Maximum plant height was observed in plants inoculated with VAM at 100 percent recommended phosphate and least in control in sterilized as well as non-sterilized soil. Past research showed that VAM alone or with phosphate increased growth of plants. (Mosse, *et al.*, 1969) observed that mycorrhizal seedlings grow better in both sterilized and non-sterilized soil as compared to untreated plants of Onion. (Arafat *et al.*, 1995) observed increased growth in *Vicia faba* in hydroponic culture.

Maximum number of leaves per branch was recorded in plants with VAM inoculum at 100 percent recommended phosphate and in control in both sterilized and non-sterilized soil it was minimum. Combinations of VAM and phosphate showed promising results. Similar trend was observed in Red Maple (*Acer rubrum*) reported by Daft and Hacskaylo (1977) in *Tamarindus indica*, L., *Acacia nilotica* and *Calliandra calothyrus* by Reena and Bagyaraj (1990).

Inoculation of plants with VAM without phosphate shows two-fold increase in vegetative growth parameters as compared to uninoculated plants without phosphate. In VAM with 50 percent recommended phosphate there was tenfold increase as compared to uninoculated plants without phosphate. Biermann and linderman (1983) reported that total leaf area was increased in inoculated plants as compared to uninoculated plants in China aster. Similar results were recorded by Kanade and Bhosale (2014) in *Cassia tora* L., Kanade and Bhosale (2013) in *Dolichos lab-lab*, Linn. and Kanade and Bhosale (2013) in *Sida acuta*, Burm.

Percentage of VAM colonization was higher in mycorrhizal plants with 50 percent recommended phosphate in sterilized and non-sterilized soil as reported by (Okon *et al.,* 1996) in *Gliricidia sepum* and *Senna siamea.* There is increase in VAM colonization level in nonsterilized soil inoculated with VAM similarly reported by Bagyraj and Manjunath (1980) in Cotton Cowpea, Menge*, et al.*, (1998) in Citrus. Present investigation clearly indicates that Perennial Soybean (*Neonotonia wightii* (Wight & Arn.) J.A. Lackey) responded positively to *Glomus fasciculatum.* VAM inoculation in combination with Phosphate at all levels increased height of plants and number of leaves per branch.

CONCLUSION:

Neonotonia wightii (Wight & Arn.) J.A. Lackey is competitive growing cover weed which requires no special care to be taken and grows intensively in natural habitat. It can be cultivated to compete with unwanted under cover weeds Considering its nitrogen fixing ability and fodder value Perennial Soybean must be brought in main stream of cultivation as fodder cover crop. However, VAM inoculation will help increase its productivity and commercial status.

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Table 1: Growth performance of Perennial Soybean in response to various levels of phosphate, and VAM in non-sterilized and sterilized soil.

Soil type	**Non sterilized**					
Set	I	II	III	IV	V	VI
Treatments	UP00	IP00	UP100	IP100	IP75	IP50
Parameters	*	*	*	*	*	*
Plant height (m)	7.2 ±0.1	10.30±0.1	12.1 ± 0.2	16.01 ± 0.2	15.00 ± 0.2	15.00±0.01
Avg. No. of Leaves/branch	10.00 ± 00	14.00±00	12.66±0.1	18.00±0.11	15.00±0.1	13.03±0.1
% VAM Colonization	00	11.1	00	40.2	20.6	10.5
Spore count (Per 50 gm of soil)	00	09	00	27	28	24

Soil type	**Sterilized**					
Set	I	II	III	IV	V	VI
Treatments	UP00	IP00	UP100	IP100	IP75	IP50
Parameters	*	*	*	*	*	*
Plant height (m)	7.02±0.2	13.20±0.01	14.01 ± 0.2	19.05 ± 0.1	19.01 ± 0.1	17.00±0.2
Avg. No. of Leaves/branch	16.00 ± 00	13.00±0.1	18.66±0.1	20.10±0.2	20.00±0.3	19.01±0.3
% VAM Colonization	00	11	00	51	17	20
Spore count (Per 50 gm of soil)	00	12	00	29	25	26