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International	Impact of Two Saline AM Fungi on Growth of Onion (Allium cepa L.)		
Neelakandan. M	P.G. and Research Department of Microbiology, Marudupandiyarcollege, Thanjavur, Tamilnadu, In	dia.	
Mahesh.V	Department of Botany , M,R Govt .Arts college, Ma Tamilnadu, India.	annargudi,	
ABSTRACT A pot sp, (G pots v of colonization, morphometric all the treatment when compa	trial was conducted to study the impact of AM fungi on growth of onion lomus fasiculatum and Gigaspora margarita) were selected for this study. Onion vith different treatment of AM fungi, after 60 days, they were evaluated for AM fu and biochemical parameters. The results showed that AM fungi had significantly red with control.	(Allium cepa L). Two AM fungal seedlings were grown in plastic ngi spores' number, percentage increased in growth of onion in	
	KEYWORDS : AM fungi, Allium cepa.		

# INTRODUCTION

Various type microorganisms available in the soil. Among them, Arbuscular mycorrhiza (AM) is a group of obligate fungi that lives in a symbiotic relationship with the roots of 98% plants. AM fungi play an important role in improve crop growth and productivity (Schreiner *et al.*, 2003; Kapoor *et al.*, 2004). They benefit their host plants by improving nutrient uptake like phosphorus (P), nitrogen (N) and micronutrients (Barea *et al.*, 1991; Clark & Zeto, 2000; Ward *et al.*, 2001; Javaid, 2009). AM fungi also provide to their host plants with protection against environmental abiotic stresses (Javaid, 2007; Azcón *et al.*, 2009) as well as, biotic stress (Khaosaad *et al.*, 2007).

Onion (*Allium cepa L*.) is one of the leading vegetable crops worldwide. Large amounts of chemical fertilizers are usually used in onion cultivation. The use of chemical fertilizers, however, has its negative side. In general, chemical fertilizers are expensive, produce short-term benefits and above all, their use may contribute to environmental pollution. Therefore, attempts have been directed towards minimizing dependence on chemical fertilizers. For onion production, one way to do so would be the use of AM fungi. Previous research indicated that onion is highly responsive to several fungi, which tend to associate with onion roots leading to improved plant growth and nutrient uptake. The present study was undertaken to assess the effect of two of AM fungi, on growth of onion by pot culture method.

## MATERIALS AND METHODS

To study the impact of AM fungi on growth of onion by pot culture experiment. Two AM fungal sp *Glomus fasiculatum* and *Gigaspora margarita* used in this experiment were isolated from the saline soils of Muthupet, Tamail nadu, India. Soil used for pot culture this study was a phosphorus deficient and sandy loam with pH .7 organic matter 1.4% nitrogen 217 kg/ha<sup>-1</sup>, K20:234 KG/ha<sup>-1</sup> and P<sub>2</sub> O<sub>3</sub>:14kg/ha<sup>-1</sup>. Each pot measuring 15×15 cm diameter was filed with sterilized soil. A thin layer of inoculums (25g) was placed 2 cm below the surface, to the soils of experimental pot before sowing the seeds.

Allium cepa L seeds were soaked for 48 hrs in cold water and grown in separate pots containing sterilized sandy loam soil. One month old seedlings of uniform height were transplanted to the experimental pots plants were maintained in green house for 60 days. Three replicates were maintained for each treatment. Modified P free Hoagland solution was provided for experimental pots twice in a weak. The following parameters were measured after 30 <sup>th</sup> and 60 <sup>th</sup>, day of harvesting viz. Plant height, root length, shoot length plant biomass.

The experimental treatments in this experiments were 1.Control (without AM) 2. *Glomus fasciculatum* along 3. *Gigaspora margarita* along 4. *Glomus fasciculatum* and *Gigaspora margarita* 

The soil samples weingre examined for AM spore numbers after wet sieving and decantation (Gerdemann and Nicolson., 1963). The root samples were stained with tryphan blue in lactophenol (Phillips and

Hayman., 1970). Percentage of root colonization was calculated (Kr-ishna and Dart., 1984).

Total no of cells infected

% infection =

×100

Total no plant cell infected

## **Estimation of total Chlorophyll Content**

For chlorophyll a, chlorophyll b and total chlorophyll the method of (Arnon, 1949. and Withman, *et al.*, 1971) was employed. Calculation of the amount of chlorophyll present in the extract as mg chlorophyll per gm green tissue using the following equations for each fraction;

For chlorophyll a v Mg chlorophyll a per gm tissue =  $12.7 (A_{663}) - 2.69 (A_{645}) \times$ 1000×W For chlorophyll b ν Mg chlorophyll a per gm tissue =  $22.9 (A_{645}) - 4.68 (A_{663}) \times -$ 1000×W Total chlorophyll v Mg total chlorophyll =  $20.2(A_{645}) + 8.02(A_{663}) \times$ 1000×W

Where,

A = Absorbance at specific wavelength V = Final volume of chlorophyll extract in 80% acetone W = Fresh weight of tissue extracted

## **Estimation of total Carbohydrate Content**

For carbohydrate the method of (Hedge and Hofreiter., 1962) was employed. Calculation of the amount of carbohydrate present in the extract as mg carbohydrate per gm green tissue using the following equations for each fraction

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Mg of glucose

Amount of carbohydrate present in 100 mg of sample -×100

Volume of test sample

#### **Estimation of total Protein Content**

For Protein the method of (Lowry, et al., 1951) was employed. Calculation of the amount of Protein present in the extract as mg Protein per gm green tissue using the following equations for each fraction

Express the amount of protein mg/g or 100g sample in graph value

## **Estimation of total Lipids Content**

For lipids the method of (Cox and Pearson., 1962) was employed. Calculation of the amount of lipids present in the extract as mg lipids per gm green tissue using the following equations for each fraction

Titer value ×Normality of KOH ×56.1

Acid value (mg KOH/g) = -

Weight of the sample (g)

# RESULTS

Table I: Plant height fresh weight and dry weight of onion.

Treatment	Control	Glomus fasiculatum	Gigaspora margarita	Glomus fasiculatum and Gigaspora margarita	
Plant height	22.11 ± 1.18	30.49 ± 1.58	32.67±2.02	35.32 ±0.98	
Fresh weight	5.4 ± 1.57	8.7 ± 1.07	9.5± 5.31	10.8 ±1.22	
Dry weight	2.1 ± 0.33	3.7± 1.00	4.5 ±0.69	5.2±0.57	

Table Π: No. spores, and percentage of root colonization on onion.

Treatments	% of AM Root colonize	No. of Spores in 100g soil	
Control	-	-	
Glomus fasiculatum	49	271±0.38	
Gigaspora margarita	88	567 ± 1.57	
Glomus fasiculatum and Gigaspora margarita	95	590 ± 1.74	

Table III: Effect of AM fungi on biochemical parameters of onion.

S. No.	Treatment	Chlorophyll a mg/g	Chlorophyll b mg/g	Total Chlorophylls mg/g	Pro- tein mg/g	Carbohy- drate mg/g	Lipids mg/g
1	Control	0.004	0.021	0.024	30	78	0.953
2	Glomus fasicula- tum	0.021	0.062	0.084	120	129	1.346
3	Gigaspora margarita	0.019	0.074	0.093	140	130	1.402
4	Glomus fasicula- tum and Gigaspora margarita	0.05	0.091	0.102	145	136	1.435

### **RESULTS & DISCUSSION**

In the present study, onion plants were positive for AM fungal colonization except uninoculated control plants. The percent root colonization ranged from (49% to 95%) percent in onion. Percent colonization of AM fungi in throats of onion different in each pots. It was maximum (95%) in plants inoculated with dual inoculam of Glomus fasiculatum and Gigaspora margaritai and minimum (49%) in Glomus fasiculatum alone treated pots (Table- II). AM fungi are known to improve plant growth mainly through increase P uptake and nutrients

The morphological growth parameters like plant height, fresh and dry weight of plants were influenced by AM fungi when compared with control. They also were increased in plants inoculated with dual inoculation of Glomus fasiculatum and Gigaspora margarita then the individual inoculation and control (Table- I). The results were correlated with the findings of Bolanduazar, 2009 and Shind et al 2013. The mean plant height of AM onion (dual inoculation) was 50 % increase with control.

In this test, Total chlorophyll, total carbohydrate and total lipids were significantly increase in AM treated pots chlorophyll level was higher in plants inoculated with Glomus fasiculatum (Table - III) Gigaspora margarita treated plants. (privadarshini, 2012) demonstrated that AM colonization in plants enhance the total chlorophyll contained in leaf. Total carbohydrate ,total protein and total lipids more in plants treated with dual inoculation of Glomus fasiculatum and Gigaspora margarita when compared with Glomus fasiculatum and Gigaspora margarita alone inoculam and control.

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