Arbuscular Mycorrhizal Colonization in roots and resting spore in the rhizospheric of *Lepidagathis cristata* Nees.

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ABSTRACT:

The present paper deals with the Arbuscular Mycorrhizal Colonization in roots and resting spore in the rhizospheric of *Lepidagathis cristata* Nees. Collected from S.R.T.M.University Campus, Nanded, Maharashtra.

The root of *Lepidagathis cristata* Nees. had 60% mycorrhizal colonization, and the vesicles found in the full mount of roots were spherical, globular, and even elongated in shape. The presence of various forms of chlamydospores was discovered in rhizospheric soil tests, with Glomus sps dominating. Acaulospora and Gigaspora were the other two species.

KEYWORDS: Arbuscular Mycorrhizal Colonization, *Lepidagathis cristata* Nees.

INTRODUCTION

Frank (1885), a German botanist, used the name Mycorrhizae to describe the symbiotic association between fungi and plant roots for the first time. Since then, scientists have begun to exploit them for the benefit of humanity. Dangeard coined the term "vesicular arbuscular mycorrhiza fungus" (1900) Peyronel (1924) was the first to name arbuscular mycorrhizal fungi Endogone, and Mosse (1956) was the first to show that Endogone species could produce arbuscular mycorrhizal.Arbusscular Mycorrizal fungus can be found all over the world. They're mostly found in the soil as chlamydospore, but they've also been linked to a wide range of plant communities in the plant kingdom. (Gerdemann, 1968)

Mycorrhizae are characterized as a mutagenic interaction, i.e. a non-pathogenic relationship that includes fungi and higher plant roots in the soil. The word Mycorrhizae comes from the Greek word myco-fungus, which means mushroom, and rhiza-root, which means fungal root. It was coined by German pathologist Frank in 1885 to describe how both partners are compensated, i.e. the fungus supplies nutrients and phosphorous to the plant, while the plant offers organized food for the fungus. Endomycorrhizae or endotropic mycorrhizae and ectomycorrhizae or ectotropic mycorrhizae are the two main types of mycorrhizae. So far, seven major important groups have been established and more may be described in case that new morphological, anatomical, or molecular observation will make it necessary (Opik, M.*et.al.*,

2006). Ectomycorrhiza and endomycorrhiza are important in agriculture and forestry. Endomycorrhiza plays an important role in enhancing the plant's growth. Beena, et al., (2000) investigated the diversity of arbuscular mycorrhizal fungus on the west coast of India's coastal dunes. Sharath B and Manoharachary (2003) investigated the presence of arbuscular mycorrhizal fungi in the rhizosphere soils of medicinal plants. Agronomical and environmental variables influence root colonization, sporulation, and diversity of Arbuscular Mycorrhizal Fungi during a certain phonological stage of Banana Trees, according to Anaya et al. (2006). Koul et al. (2012) investigated a variety of arbuscular mycorrhizal fungus linked with medicinal plants in the Gwalior-Chambal region of Madhya Pradesh, India. Mulani et al. (2012) investigated the presence of heat-tolerant Arbuscular Mycorrhizal Fungi in the roots and rhizospheric soil of Aloevera (L.) Burm.f. Kumar et al. (2013) investigated the Biodiversity of Endophytic Mycorrhizal Fungi linked with various medicinal plants in Himachal Pradesh. AM colonization was examined in 10 herbaceous plants buts from the Asteraceae family from the Bhadra wildlife reserve by Hemavani et al., 2013. Mulani et al. (2012) investigated the isolation and identification of arbuscular mycorrhizal fungi from Vietnamese agricultural areas. Chandra et al. (2014) investigated the isolation and identification of certain arbuscular mycorrhizal (AM) fungi for phytoremediation in paper mill effluent-contaminated soil. In heavy metal-contaminated soils, Gunwal et al. (2014) looked at spore density and root colonization by arbuscular mycorrhizal fungi. Parial, et al., (2014) investigated arbuscular mycorrhizal fungi and assessed their impact on plants. Chemical fertilisers have a negative impact on human health. Tabin et al. (2014) investigated the distribution and diversity of AM fungus in the Rhizosphere soils of naturally and artificially growing Aquilaria malaccensis Lamk. trees in the North-East Indian states of Arunachal Pradesh and Assam. Anatomical characterization of Lepidagathis cristata Nees Wild, an indigenous medicinal plant, by Bhogaonkar et al. A frequent herb in dry wastelands is Lepidagathis cristata, a wild species of the Acanthaceae family. Bryan Youndchuanwand (2015) investigated the isolation of various plant roots and their environments; the current study aims to isolate and describe ArbuscularMycorrizal Fungi (AMF) root colonization in Kota samarahan, Sarawak. Kumar et al. (2015) investigated spore population, colonization, species diversity, and variables influencing the connection of Arbuscular Mycorrhizal Fungi with litehi trees in India. Thapa, et al. (2015) investigated the relationship and root colonization of arbuscular mycorrhizal fungus with various medicinal plants. Almeida.et.al. (2016) investigated the effect of salinity on the growth of Arbuscular Mycorrhizal Fungi-colonized bananas. Jobim et al. (2016) investigated the diversity of Arbuscular Mycorrhiza Fungus (Glomeromycota) in Brazilian coastal dunes. Wang and Jiang (2015) used morphological research on medicinal plants in Southeast China to investigate the colonization and diversity of AM fungus.

Botanical Description of *Lepidagathis cristata* Nees.

Lepidagathi scristata Nees.Wild.Sp.Pl.2:400.1800 Hook. F.Fl.Brit.India 4: 516.1885; Cooke, Fl.Pres.Bombay 2: 470. 1958. (Repr.); Londhe in Singh et al. Fl.Maharashtra St. Dicot. @: 645. 2001.

Perennial, procumbent under shrubs, branching from the woody base. Leaves in globose clusters at the base of stems, spinous pointed, hairy. Calyx 4-partite to the base; sepals unequal, the lower often 2-fid, spinous pointed, Corolla pale pink with brown dots. Seeds densely clothed with hygroscopic hairs. Frequent on rocky soils in grasslands.

MATERIAL AND METHOD:

Samples were collected from root and soil plants in March 2017 From Swami Ramanand Marathwada University, Nanded. These sites were selected in the area with a distance less than 10 cm from each other. Soil and plant samples were collected from surface to 30 cm depth. Roots were washed with distilled water, cleaned with 10% KOH for 30-45 minutes at 90°F, and then acidified for 5-10 minutes in 1% HCL. After that, they were dyed for 10 minutes with cotton blue (0.05 percent in lacto glycerol). 12 hours staining and they filter in root. After 10ml lactic acid 10 ml glycerol, 20 ml water, 1ml phenol crystal prepare in solution and add root in detained and blue color are rinsed root cut observe a slide. Under microscope (10x, 40x, 100x) and percentage root colonization (Khakpour et. al, 2012).

Fig: Study area in the S. R. T. M. University Campus, Nanded.

Fig: Sieves used for isolation.

Fig: Isolation of spores from rhizospheric soil

For a particular host, the total number of infected root segments or root segments infected for any type of propagule (i.e.Hyphae, arbuscules, vesicles or chlamydospores, etc.), out of the total number of root segments (of equal size) screened was expressed as percent root colonization. The root segments were uniformly spread on a slide to view all the root segments without having to move other segments. 100 root segments were mounted and analyzed. (Khakpour et.al, 2012).

Calculation was done formula:

$$\% \text{ AM Root colonization } = \frac{\text{Total no of root segment colonised}}{\text{Total no of root segment examined}} \text{X } 100$$

Fungus spores were isolated using a wet-sieving and decanting method. Sieves of various sizes were employed for this, including 710 µm, 210 µm, 145 µm, 75 µm, 45 µm, and 25 µm. A 10g soil sample was well mixed in 500ml water in a beaker with a magnetic stirrer and allowed to settle. From top to bottom, the sieves were arranged in the following order: 710um, 210um, 145um, 75um, 45um, 25um. The beaker's water was decanted onto a succession of sieves, where spores were tapped and then cleaned under flowing tap water. After several washings with water, the trapped spores were moved to Petri plates and selected with a needle under a microscope.The spores were mounted on glycerol for further observation. Estimation of Arbuscular Mycorrhizal fungal Spore was done by method of Gaur et.al. 1994.

RESULT AND DISCUSSION:

Arbuscular Mycorrhizal Colonization was found to be 60%. The vesicles were elongated, rounded, globular, and conspicuous. Coenocytic, non-septate, and branching hyphae. Spores 60/10gm of soil was found in the rhizoisperic soil study. Glomus, Gigasora, Acaulospore, Glomus fasciculatum, and Scutellospora are the Arbuscular Mycorrhizal genera found. In comparison to other Arbuscular Mycorrhiza taxa, Glomus genes were dominating.Cornocytic hyphae, vesicle hyphaes, and vesicle are seen in root of Lepidagathis cristata Nees. And magnified view of rounded vesicles is seen in whole mount of root of Lepidagathis cristata Nees. Arbuscules in whole mount of root of Lepidagathis cristata Nees. Different types of spore are seen such as honey color Chlamydospores of Glomus with thick wall. Light colored thin-walled chlamydospore of Acaulospora, glomus fasciculatum.

Sr.no	**Parameters**	**Results**	
1.	Plant species	*Lepidagathis cristata* Nees	
2.	Family	Acanthaceae	
3.	Place	Swami Ramanand Teerth Marathwada University, Nanded.	
4.	Habitat	Herb	
5.	Vesicle	+	
6.	Arbuscule	+	
7.	Mycelium	+	
8.	% colonization	60%	
9.	Resting spore density	Sample :	60/10 gm of soil
		Total	60
			60/1 = 60/10gm of soil.
10.	AM fungal species	Single spore of *Gigaspora* sp. Honey color chlamydospores of *Gigaspora* with thick wall. Light colored thin-walled chlamydospores of *Acaulospora.* Honey color chlamydospores of *Glomus* with thick wall *Acaulospora*. Chlamydospores of Glomus fasciculatum with thick wall. Thin-walled chlamydospores of Acaulospore with thick wall. Honey colour *chlamydospores.*	

		Single spore *Scutellospore.*

Table: Summer season of Arbuscular colonization in roots and isolation of resting spore number in rhizospheric soil of *Lepidagathis cristata* Nees.

Sr.No.	Soil Parameters	Summer
1	Colour	Reddish Brown
2	Texture	
	Gravel%	31
	Sand%	22
	Loam%	25
	Clay%	22
3	Temperature ^{0}C	40 ^{0}C
4	Moisture%	15
5	pH	7.8
6	Electrical conductivity (m-mhos/cm)	0.12
7	Organic Carbon (%)	0.25
8	Phosphorous Kg/H	1.72
9	Potassium kg/H	134
10	Copper (ppm)	2.1
11	Iron (ppm)	1.6
12	Manganese (ppm)	4.60
13	Zinc (ppm)	0.22

Table. Physicochemical analysis of rhizospheric soil in Swami Ramanand Teerth Marathwada University campus

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Fig -Habit *of Lepidagathiscristata* Nees.

Fig: Arbuscular hyphae were seen in mount of root of *Lepidagathis cristata* Nees.

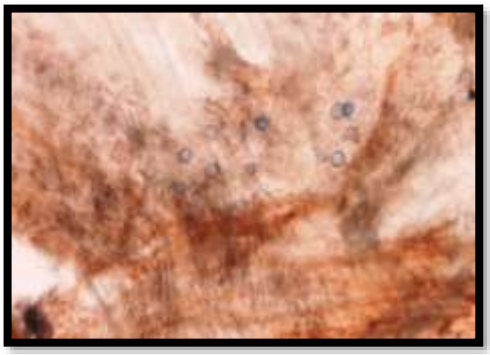

Fig: Vesicle and coenocytic hyphae were seen in whole-mount of root of *Lepidagathis cristata* Nees.

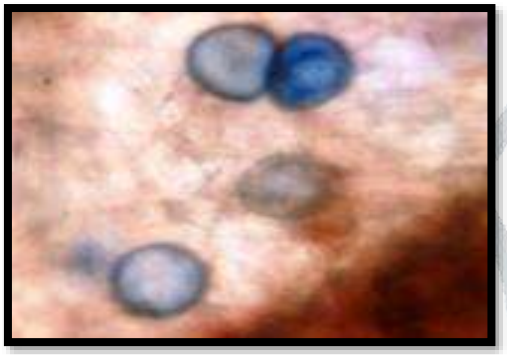

Fig: Magnified view of rounded vesicles

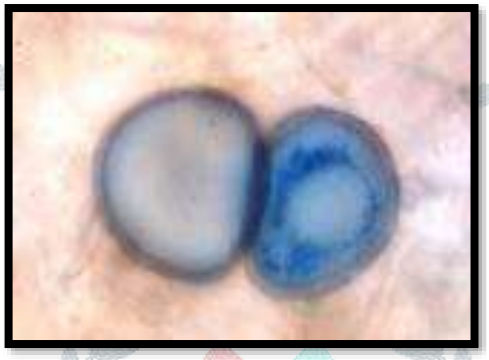

Fig: Typical vesicle showing suapensor like bulbous attachment inside the root of *Lepidagathis cristata* Nees.

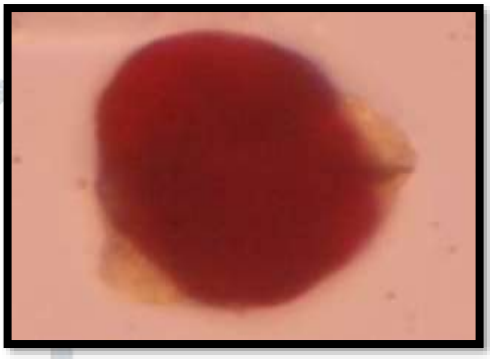

Fig: Honey color chlamydospore of *Glomus* with thick wall.

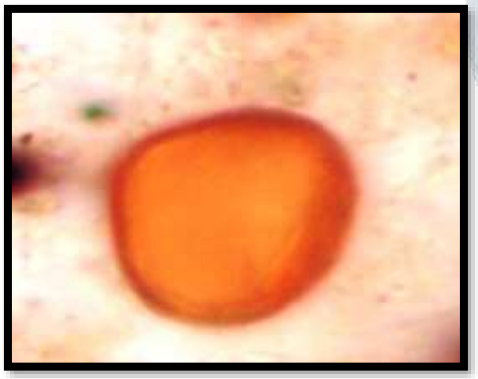

Fig: *Gigaspora* surface view of spore

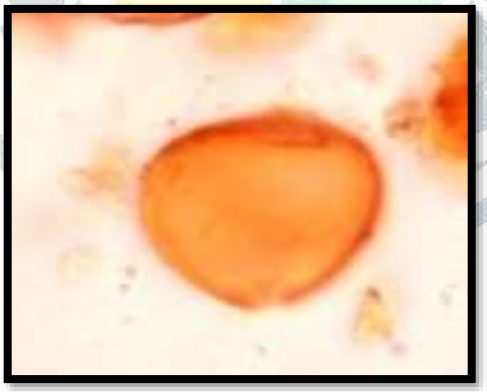

Fig: *Gigaspora* surface view of spore

Fig: *Acaulospora.*

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