International Journal of Advance and Applied Research
www.ijaar.co.in
ISSN – 2347-7075 Impact Factor – 7.328
Peer Reviewed Bi-Monthly
Vol.10 No.6 July-Aug 2023

Arbuscular Mycorrhizal Fungi in Some Cereals crop plants of Marathwada, India

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DOI- 10.5281/zenodo.8237878

Abstract

The objective of the present study was to investigate the extent of AM Association in *Pennisetum typhoides*, *Sorghum vulgare*, *Zea mays*, and *Triticum aestivum* plants in Marathwada region of Maharashtra. The result showed that all the different cereals crop plants had AM fungal association in the roots and spore population in the rhizosphere soil. *T. aestivum* showed maximum colonization in Osmanabad sites (95 %) than other three sites whereas, *P.typhoides* showed minimum colonization in Beed sites (20%). Hyphal, vesicular and arbuscular types of colonization were found in roots of different cereals crop plants. *T. aestivum* showed more spore density (309) in Aurangabad sites whereas less observed in other three tested plants of Beed, Jalna, and Osmanabad sites. Total five genera of AMF were identified up to species level in which *Acaulospora spp* and *Glomus spp* were found dominate followed by, *Sclerocystis spp*, *Entrophosphora spp* and *Gigaspora spp* were found poorely distributed. Highest number of AMF species were found in Osmanabad sites (09) while the lowest number of AM fungal species were recorded in Aurangabad and Jalna sites (03) with *P.typhoides* and *Z. mays* respectively

Key words: AM fungi, Cereals crop**,** Root colonization.

Introduction

Arbuscular mycorrhizal fungi (AMF) establish symbiotic associations with most terrestrial plants. AMF are soil microorganisms that form a symbiotic relationship with 80–90% of vascular plant species and 90% of agricultural plants (Smith and Read, 2010).

The food grains comprise cereals and pulses. The term "Cereals" (also called grains) refers to members of the Gramineae family. Cereal crops are mostly grasses cultivated for their edible seeds (actually a fruit called a caryopsis). Among cereals rice, wheat, maize and the coarse grains like sorghum, pearl millet, barley etc. are the major crops. Cereals form an important ingredient in the vegetarian diet and they are also rich source of energy, minerals and contain vitamins (Chaudhari and Pawar, 2010). India is second position in agricultural production in the world. Among the crops grown, cereals form the major bulk. Wheat and rice are the most important crops worldwide as they account for over 50% of the world's cereal production. Maharashtra is the largest producing State of coarse cereals with 19.35 per cent share of production to all India level.

The cereals are common and important staple food crops for the people of the Marathwada region of Maharashtra State. Some of the important cereal crops of the region are Bajra - pearl-millet (*Pennisetum typhoides* Burm.), Jowar (*Sorghum vulgare* pers.), Maize/Corn (*Zea mays* L.,) and Wheat (*Triticum aestivum* L.) belonging to the family Poaceae.

Hence a study was to obtain information on AM fungal status of

important cereal crops Viz. Bajra, Jowar, Maize and Wheat plants in Marathwada region of Maharashtra.

Materials and Methods

Rhizosphere soil and roots sample of selected cereal crops plants were collected from each plant in three replications. Root samples were brought to the laboratory which were then washed in tap water and cut in to 1 cm pieces in length. Root samples were cleared and stained using Phillips and Hayman (1970) technique. Root colonization was measured according to the Giovannetti and Mosse (1980) method. Hundred grams of rhizosphere soil samples were analyzed for their spore isolation by wet sieving and decanting method Gerdemann and Nicolson (1963). Identification of AM fungal species was done by using the Manual for identification by Schenck and Perez (1990).

Results and Discussion

Cereals crop along with their AM fungi characterizations are presented in the Table 1. The result shows that, all the tested plants were colonized by AM fungi. *T. aestivum* showed maximum colonization in Osmanabad sites (95 %) than other three sites whereas, *P.typhoides* showed minimum colonization in Beed sites (20%). Hyphal and vesicular types of colonization were found in roots of different cereals crop plants. Arbuscules were observed in *T. aestivum* and *S. vulgare*. *T. aestivum* showed maximum number of spores (309) in rhizosphere soil of Aurangabad sites than Beed, Jalna, and Osmanabad sites.

Total five genera were observed *viz. Glomus spp, Acaulospora spp*, *Sclerocystis spp*, *Entrophosphora spp* and *Gigaspora spp*. Highest number of AMF species were found in Osmanabad sites (09) while the lowest number of AM fungal species were recorded in Aurangabad and Jalna sites (03) with *P.typhoides* and *Z. mays* respectively.

Among five AM fungal species *Acaulospora spp* and *Glomus spp* was dominant whereas *Sclerocystis spp*, *Entrophosphora spp* and *Gigaspora spp*. were poorely distributed. Deepak et al., (2007), Sanjay, (2008), Prakash et al., (2012), Prakash et al., (2021), Sharada and Rodrigues, (2008) reported that *Glomus* species was dominant and recovered from all the study sites.

Conclusion

Mycorrhizal spores in rhizosphere soil and root colonization of cereals crop indicated that these plant species might be considered good host for AMF under natural conditions. Studies on distribution and mycorrhizal status of plants should enable us to understand the influence of these mycobionts on plant species and distribution.

Acknowledgements

Authors are greatly thankful to Principal, Shikshan Maharshi Guruvarya R. G. Shinde Mahavidyalaya, Paranda for their constant encouragement and providing necessary facilities.

Table 1. Percent root colonization and spore population in Cereals crop

Plant species	Location	Colonization (%)*	Types of colonization	Spore population*	AM fungal Species
Sorghum vulgare pers.	Jalna	72	HV	201	*A. scrobiculata, A thomii, E. hexagoni, G. ambisporum, G. intararadices.*
	Beed	62	HVAr	158	*E. hexagoni, G. mosseae G. austral, Sc. sinuosa.*
	Osmanabad	78	HV	198	*A. scrobiculata, G. multicaule, G. intraradices, G. geosporum,*
	Aurangabad	72	HV	202	E. hexagoni, G. multicaule, G. constrictum.
Penniseturn typhoides Burm	Jalna	50	HV	109	*A. scrobiculata, E. hexagoni,*
	Beed	20	H	72	*E. hexagoni, G. mosseae*
	Osmanabad	56	HV	127	*G. intraradices, G. geosporum, G. flavisporum, G. fasciculatum,*
	Aurangabad	58	HV	197	E. hexagoni, G. multicaule,
	Jalna	68	HV	35	*A. scrobiculata, E. hexagoni, G.*

					ambisporum, G. intararadices.
Zea mays L	Beed	72	H	62	*E. hexagoni, G. mosseae G. austral, Sc. sinuosa. Gi.albida*
	Osmanabad	68	HV	53	*A. scrobiculata, G. multicaule, G. intraradices, G. geosporum, S. pellucida Gi.margarita*
	Aurangabad	70	HV	70	E. hexagoni, G. multicaule,
Triticum aestivum L	Jalna	87	HVAr	160	*A. scrobiculata, A thomii, E. hexagoni, G. ambisporum, G. intararadices.*
	Beed	80	H	202	*E. hexagoni, G. mosseae G. austral, Sc. sinuosa. Gi.albida*
	Osmanabad	95	HVAr	202	*Sc. leptoticha, A. scrobiculata, G. multicaule, G. intraradices, G. geosporum, G. flavisporum, G. fasciculatum, S. pellucida Gi.margarita*
	Aurangabad	92	HVAr	309	E. hexagoni, G. multicaule, G. constrictum.

*

Mean of three samples; H-Hyphae; V-Vesicular, Ar-Arbuscules, A-*Acaulospora,* E-*Entrophosphora,* G-*Glomus* Gi- *Gigaspora, Sc.-Sclerocystis.*

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