APPLIED RESEARCH IN BOTANY VOLUME-1

Dr. Anil Laxman Bhalerao
[M.Sc. Ph.D.]

Dr. Rajesh Shrirangrao Gaikwad
[M.Sc. Ph.D.]

mp mahi Publication

ISBN: 978-93-90651-59-7

First Edition: 2021

PRICE ₹ 399/-

PUBLISHER
MAHI PUBLICATION

Office No.1, Krishnasagar Society, Nr. Shivsagar sharda Mandir Road, Ahmedabad-380007

mahibookpublication@gmail.com

+(91) 798 422 6340

www.mahipublication.com

INDEX

16. OCCURRENCE OF AM FUNGI IN *CASSIA TORA L.* PLANTS OF OSMANABAD DISTRICT

Prakash. P. Sarwade	S. G. R. G. Shinde. College Paranda, Dist-Osmanabad-413 503 (M.S.) India
Shahaji S. Chandanshive	S. G. R. G. Shinde. College Paranda, Dist-Osmanabad-413 503 (M.S.) India.
Vikas P. Sarwade	S. G. R. G. Shinde. College Paranda, Dist-Osmanabad-413 503 (M.S.) India.
Kavita N. Gaisamudre	Department of Botany, Shriman Bhausaheb Zadbuke Mahavidyalaya, Zadbuke Marg, Jamgaon Road, Barshi Tal. Barshi, Dist- Solapur 413 401. (M.S.), India

ABSTRACT

A survey of the arbuscular mycorrhizal (AM) status associated with Cassia tora L. plants growing and distributed in Osmanabad district of Marathwada region in Maharashtra state. The result showed that all the different sites Cassia tora L. plants had AM fungal association in the roots and spore population in the rhizosphere soil. However, maximum percent root colonization of AM fungi was observed in Paranda sites (98 %) followed by others, while minimum in Omerga sites (58 %).Paranda sites (300) showed more spore density whereas less in Kallam sites (59). Total five genera of AMF was identified up to species level in which Acaulosporaspp and Glomus spp were found dominate followed by, Sclerocystis spp, and Gigaspora spp were found poorely distributed.

KEYWORDS *Cassia tora L.*, Root colonization, AM fungi.

INTRODUCTION

More than 80% of all plants are associated with AMF in their root system (Smith and Read, 1997). These well-established AMF contribute to the phosphorus nutrition of plants by enhancing phosphorus uptake from the soil (Draft and Nicolson, 1966). *Cassia tora L.* is considered an annual weed, is very stress tolerant, and is easily grown. In India, it occurs as a wasteland rainy season weed and its usual flowering time is after the monsoon rains, during the period of October to February. Cassia tora grows in dry soil from sea level up to 1800 meters. The seed can remain viable for up to twenty years. Up to 1000 plants can emerge per square meter following rain. Once the seed has matured, it is gathered and dried in the sun. In South Asia, it usually dies off in the dry season of July-October the

successful establishment of plant species which can help to improve recovery rate of the soil system.

Cassia tora has many uses. The whole plant and roots, leaves, and seeds have been widely used in traditional Indian and South Asian medicine. The plant and seeds are edible. Young leaves can be cooked as a vegetable while the roasted seeds are used as a substitute coffee. In Sri Lanka, the flowers are added to food. It is used as a natural pesticide in organic farms, and as a powder commonly used in the pet food industry. It is mixed with guar gum for use in mining and other industrial applications. The seeds and leaves are used to treat skin disease and its seeds can be utilized as a laxative. Cassia tora is made into tea. In the Republic of Korea, it is believed to rejuvenate human vision. This tea has been referred to as “coffee-tea”, because of its taste and its coffee aroma. Since Cassia tora has an external germicide and antiparasitic character, it has been used for treating skin diseases such as leprosy, ringworm, itching and psoriasis and also for snakebites. Other medicinal provisions from plant parts include balm for arthritis using leaves of Cassia tora. Cassia tora is one of the recognized plants that contain the organic compound anthraquinone and is used in Chinese and Ayurvedic medicine. This herb is used in Ayurveda for treatment of swellings. Hence a study survey was conducted around Osmanabad district in Marathwada region, where the plant is grown throughout the year to observe AM fungal genera and species that are associated with plants.

MATERIALS AND METHODS

Rhizosphere soil androots samples of C. tora plants were collected from different locations of Osmanabad district (Viz. Kallam,Omerga, Paranda, Osmanabad, Tuljapur, and Bhoom)and in each plant three replications were taken. 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) [12] technique. Root colonization was measured according to the Giovannetti and Mosse (1980) [5] method. Hundred grams of rhizosphere soil samples were analyzed for their spore isolation by wet sieving and decanting method Gerdemann and Nicolson, (1963) [6].Identification of AM fungal genera up to species level by using the Manual for identification Schenck and Perez (1990) [15].

RESULTS AND DISCUSSION

The result shows that all the C. tora plants were colonized. Maximum percent of colonization were found in Paranda sites (98 %) than other five sites whereas, minimum percentage was found in Omerga sites (58%). Hyphal and vesicular types of colonization were found in roots of different C. tora plants. More numberof spores (300) was observed in rhizosphere soil of Paranda sites. Than Kallam,Omerga, Osmanabad, Tuljapur, and Bhoom sites. Total five genera were observed viz., Acaulospora spp Glomus spp, Sclerocystis spp, Entrophosphora spp and Gigaspora spp. Highest number of AMF genera and species was associated with Paranda sites while the lowest number of AM fungal genera and species were recorded in other five locations. Among AM fungal species Acaulospora spp and Glomus spp were found dominate followed by Sclerocystis spp, Entrophosphoraspp and Gigasporaspp were found poorely distributed. The data of percent of colonization and spore number associated with C. tora plants different Osmanabad sites are presented in table 1.

The occurrence of AMF in plants has reported earlier by Taber and Trappe (1982), Udea et al., (1992), Muthukumar and Udaiyan (2001), Selvaraj et al., (2001) and Rani and Bhaduria (2001). Recently, Bukhari et al., (2003), Muthukumar et al., (2006) and Swapna and Ammani (2009), reported the occurrence of AMF in different plants from India. The highest number of mycorrhizal spores in rhizosphere soil and AM fungal infection in the roots of C. tora indicated that these plant species might be considered good host for AMF under natural conditions. Therefore, here concluded that, occurrence or distribution of AMF varies with different Osmanabad sites associated with C. tora plants.

Table1. Percent root colonization and spore number in *Cassia tora L.* Plants.

Sr No.	Plant species	Colonization (%)	Types of colonization	*Spore population	AM fungal genera
1	Kallam	73	H	70	*Glomus* spp *Acaulospora* spp
2	Omerga	58	HV	201	*Glomus* spp *Acaulospora* spp *Gigaspora* spp
3	Paranda	98	HV	300	*Glomus* spp *Acaulospora* spp . *Sclerocystis* spp, *Entrophosphora* spp

4	Osmanabad	72	HV	175	*Glomus*spp *Entrophosphora* spp . *Acaulospora* spp
5	Tuljapur	60	H	202	*Glomus*spp *Acaulospora* spp
6	Bhoom	65	HV	160	*Glomus* spp *Acaulospora* spp

*Mean of three samples, H- Hyphae V- Vesicular

Acknowledgements

Authors are greatly thankful to Principal S. G. R. G. Shinde College Paranda, for their constant encouragement.

REFERENCES

1. **Bukhari, M.J., Khade,S.W., Jaiswal, V.J., Gaonkar, U.C. and Rodrigues, B.F.(2003).** Arbuscular mycorrhizal (AM) status of Tropical Medicinal plants: A field survey of Arbuscular mycorrhizal fungal association in Herbs. *Plant Archives*, 3 (2):167-174.
2. **Draft, M.J. and Nicolson, T.H. (1966).** The effect of endogone mycorrhizae on plantgrowth. *New Phytologist*, 65:343-350.
3. **Kulkarni Jayant and Prachi Mehta. (2013).** A Study of Status, Distribution andDynamics of Private and Community Forests in Sahyadri-Konkan Corridor of Maharashtra Western Ghats. Technical Report submitted to CEPF-ATREE. WildlifeResearch and Conservation Society, Pune.
4. **Muthukumar, T. and Udaiyan, K. (2001).** Vesicular arbuscular mycorrhizal association in medicinal plants of Maruthamalai Hills,Western Ghats,Southern India.*J.Mycol.Pl.Pathol.*31(2):180-184.
5. **Muthukumar,T.,Senthilkumar,M.,Rajangam,M.(2006).**Arbuscular mycorrhizal morphology and dark septate fungal associations in medicinal and aromatic plants of Western Ghats, Southern India. *Mycorrhiza*, 17:11-24.
6. **Malloch, D.W., Pirozynski, K.A. and Raven, P.H. (1980).** Ecological and evolutionary significance of mycorrhizal symbiosis in vesicular plants. *Proceedings of National science Academic*, 75:2113-2118.

7. **Dwivedi, O.P. and Vyas, D. (2002).** Effect of Potassium on the occurrence of AM fungi. *J. Basic and Appl. Mycol,* 1:233-235.
8. **Giovannetti, M. and Mosse, B. (1980).** An evaluation of techniques of measuring vesicular arbuscular mycorrhizal infection in roots. *New Phytol*.,84:489-500.
9. **Gerdemann, J.W. and Nicolson, T.H. (1963).** Spores of mycorrhizal *endogone* species extracted from soil by wet sieving and decanting. *Trans. Br. Mycol. Soc*., 46:235-244.
10. **Phillips, J.M. and Hayman, D.S. (1970**). Improved procedures for clearing root and staining parasitic and vesicular arbuscular mycorrhizal fungi for rapid assessment of infection. *Tans. Bri. Mycol. Soc*.,55(1),158-161.
11. **Rani, V. and Bhaduria, S. (2001).** Vesicular arbuscular mycorrhizal association with some medicinal plants growing on alkaline soil of Manipuri District, Uttar Pradesh. *Mycorrhiza News.,* 13(2): 12-14.
12. **Schenck, N. C. and Perez, Y. (1990).**Manual for the identification of vesicular arbuscular mycorrhizal fungi. *Synergistic Publications:Gainesville,FL.,U.S.A*., pp.1- 286.
13. **Smith, S.E. and Read, D.J. (1997).** Mycorrhizal symbiosis, 2nd Ed. Academic, San Diego, CA.
14. **Selvoraj, T.R., Murugan and Bhaskaran, C. (2001).** Arbuscular mycorrhizal association of kashini (*Cichorium intybus* L.) in relation to Physicochemical characters. *Mycorrhiza News.,* 13 (2):14-16.
15. **Taber,T.A. and Trappe, J.M. (1982).** Vesicular arbuscular mycorrhiza in rhizomes,scale like leaves, roots and xylem of ginger. *Mycologia*., 74:156-161.
16. **Udea,T.,Husope,T., Kubo,S. and Nakawashi, I.(1992).** Vesicular arbuscular mycorrhizal fungi (Glomales) in Japan II. A field survey of vesicular arbuscular mycorrhizal association with medicinal plants in Japan. *Trans. Br. Mycol. Soc*. 33:77-86.
17. **Swapna, V. L. and Ammani,K. (2009).** Association of AM fungi on medicinal plants at coal mines of Mancheriala, Andra Pradesh. *Mycorrhiza News*. 21(2): 5-6.