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

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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.
Pennisetum 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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Barshi Shikshan Prasarak Mandal's

Shriman Bhausaheb Zadbuke Mahavidyalaya, Barshi

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Approved by Govt. of Maharashtra/Dept. of Education & Social welfare/Gen.Aff. 15734 dt. 1/11/1969

Dr. M.B. Gadekar
(M.A.,SET,B.Ed.,M.Phil.,Ph.D.,PGDCA)
Principal

Outward No. SBZMB/2023-24/
Date : 16/01/2024

To,

In-Charge

Rambhai Shah Blood Bank,

Barshi (Dist. Solapur)

Subject: Regarding permission to visit the Blood Bank for BSc III students on 18/01.2024

The BSc III students (39 with a staff member) of Microbiology Department of Shriman Bhausaheb Zadbuke Mahavidyalaya, Barshi would like to visit Rambhai Shah Blood Bank as a part of their curriculum on 18/01/2024 at 11.00 a.m. I request your permission and cooperation for the same.

Thank you,

Yours Sincerely,

(Dr. M.B.Gadekar)

BSP Mandal's

Shriman Bhausaheb Zadbuke Mahavidyalaya, Barshi

DEPARTMENT OF MICROBIOLOGY

16/01/2024

NOTICE

All the students of BSc III (Microbiology) are hereby informed that a visit to Rambhai Blood Bank, Barshi has been organised on **18/01/2024** at **11.00a.m. It is mandatory for all the students.**

Co-ordinator

N.R.Doiphode

DR.N.R.DOIPHODE

HOD

DR.MAJ. A.P. NANDIMATH

Visit to Rambhai Shah Blood Bank (BSc III-Microbiology)

Attendance(18/01/2024)

Sr. No.	Roll No.	Name of student	Signature
1	1537	Pathan Nikhat Yusuf	N. Y. Pathan.
2	1526	Ustad Alfiya Shabbir	Alfia
3	1507	Gunacharya Surbhi Suhas	Surbhi
4	1563	Shinde Jaya Vijay	J. V. Shinde
5	1559	Sahastrabudhe Kaivalya Prasad	Kaivalya
6	1521	Kamble Praniti Divakar	Praniti
7	1544	Phapal Samiksha Sanjay	Phapal
8	1543	Gidde dipak chandrakant	Gidde
9	1542	Landage shubham shrimant	Landage
10	1546	Gore Ravisraj Dharmraj	R. Gore.
11	1505	Jagtap Prajwal Anil	Prajwal
12	1531	Kadam Dinesh Bhausaheb	Kadam
13	1528	pandit somnath jagdish	Pandit
14	1561	Phumal Sujit Tanaji	Phumal
15	1534	Damare Prachi Babasaheb	Damare
16	1529	Wavare Sonal Mahadev	Sonal
17	1506	Ambade payal Sanjay	Ambade
18	1538	Thombre priyanka	Thombre
19	1503	chavan vaishnvi Narayan	Chavan
20	1536	Modi vaishvi Basveshwar	Modi
21	1524	Kate Mahadevi vaman	Kate M.
22	1504	Kate sakshi Bhausaheb	Kate S.
23	1523	Kapse sakshi Rakesh	S. R. Kapse.
24	1518	Tambe Sampada Bhausaheb	Sampada T.
25	1530	Godase sharayu Gunwant.	S. G. Godase.
26	1541	Pathan Alisha Ali	Alisha
27			




Study Visit by Department of Microbiology (18/01/2024) at Rambhai Shah Blood Banl

Name: Mansi Mahadev Sandse

Page No.: 01 Date :

Roll No. 1329.

TOUR REPORT

ON

BLOOD BANK VISIT

AT

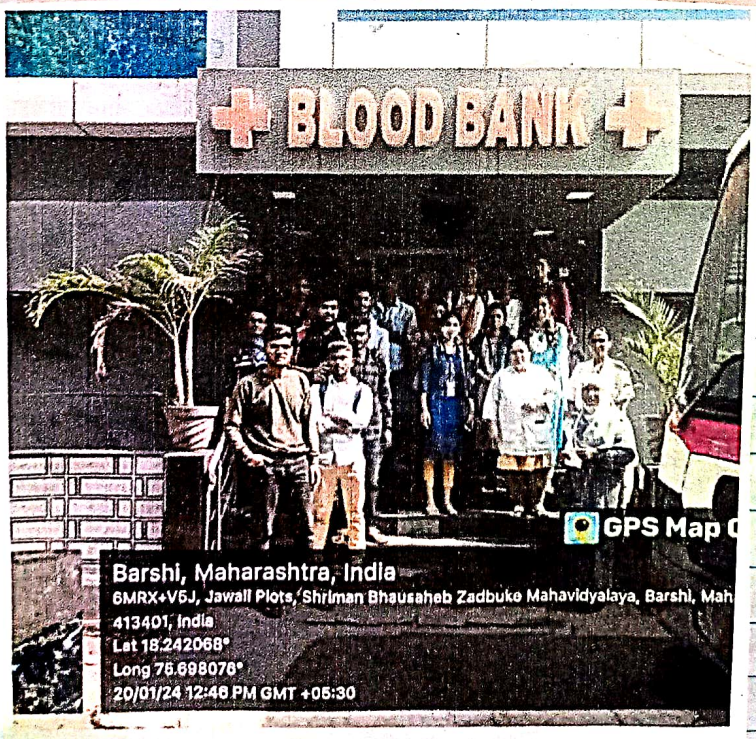
"BHAGWANT BLOOD BANK . BARSHI".

Organized by —

Microbiology department of

Shriman Bhausaheb Zadbuke Mahavidyalya, Barshi

20/January/2024



Page No.: Date :

1. Donar Selection :-

- Donor age limit is 18-60y.
- Haemoglobin - Not less than 12.5 g/dl.
- Weight - more than 45 kg.
- Mostly adults & healthy person can donate blood.

2. Donor Blood collection :-

- Select a large, firm vein preferably in the antecubital fossa, form an area.

3. Donor care :-

ask the donor to remain in the chair & relax for a few minutes.

4. Component Separation :-

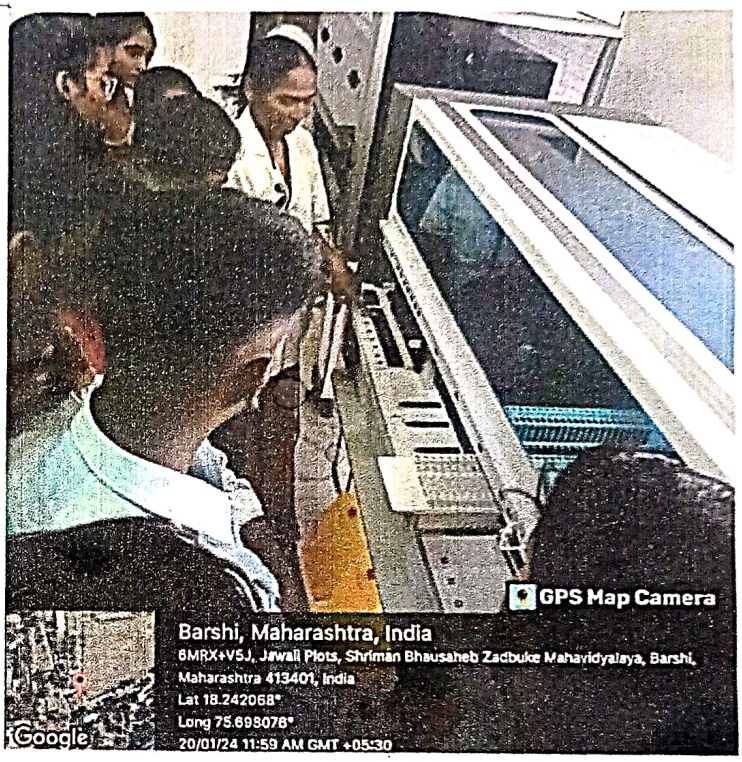
Blood components are separated by centrifugation the top layer containing plasma & bottom layer containing red blood cells.

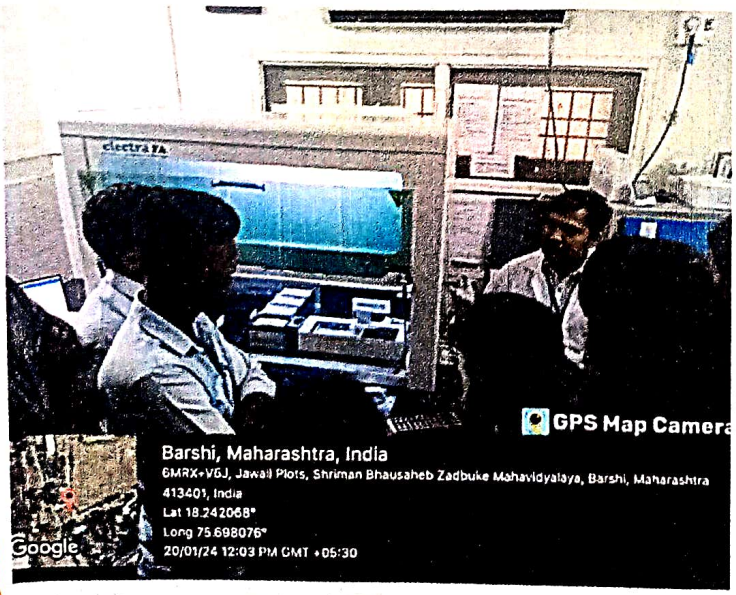
colors

Page No.: Date :

- **Nucleic acid testing (NAT):-**
- is a molecular technique for screening blood donation to reduce the risk of transfusion transmitted infections in recipients.

- SPU :- Sample processing unit.
- DNA :- detection (viral)
- PCR :- Polymerase chain Reaction.





- **TTD Lab :-**
  Testing Department.
  Diseases - HIV, HCV, MP, HBSAG.

- Antibody detection.

Page No.: Date :

- **Blood Grouping by tube method**

Testing with both Anti-A and Anti-B is necessary to determine if red blood cells possess or lack A and B blood group antigens.

- **Storage room :-**
- Red cells & whole blood must always be stored at a tem. betⁿ +2°C to +6°C in blood blank refrigerator.
- RBC → 6°C for 42 days
- platelet → 22°C to 24°C
- Plasma - 20°C to -80°C for 5 days.

Page No.: Date :

CONCLUSION.

Had a great experience and learned a lot new things about blood banking, its maintaince donor selection, handling blood units, component separation, storage, detection groups, cross matching, compatability tests, and to record and register data of individual donor and recepient information. By observing all the given things. I conclude that the company is of big scale industry. The Bhagwant Blood Bank has all the essential guidelines for maintaining quality and safe blood transfusion.

MY Heartful thanks to -

Our respected Head of Department Dr. Major Arusha Nandimath mam and dear guide shaikh mam for making it possible and successful.

colors

Educational Visit / tour

Rambai Shah Blood bank, Bansri

Attendance

Date
20/01/24

Sr. No.	Name	class	Sign
1)	Gadekam Rushikesh	BSc-II	Rushi
2)	TO Pandare Shree	BSc-II	Shree
3)	Karende Ganesh	BSc-II	Karende
4)	Kedam Khatal	BSc-II	Khatal
5)	Vijay Zalte	BSc-II	Vijay
6)	Ganesh Udmale	BSc-II	Udmale
7)	Prathmesh Kumbhar	BSc-II	
8)	Amar Kadam	BSc-II	Amar
9)	Zalte Omkar	BSc-II	
10)	Shinde Samarth	BSc-II	
11)	Bokefode Siddharth	BSc-II	
12)	Yelame Pramali	BSc-II	P.P. Yelame
13)	Siddhi Vhale.	BSc-II	S.S. Vhale.
14)	Riddhi Vhale.	BSc-II	Riddhi
15)	Sakshi Gawari	BSc-II	S. Gawari
16)	Sanika Kharade.	BSc-II	Sanika K.
17)	Mansi Sandse	BSc-II	Mansi S.
18)	Sonali Choughule	BSc-II	Sonali C.
19)	Vaishnavi Thorat.	BSc-II	Thorat V.
20)	Revati Chavan	BSc-II	R. Chavan

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Dr. Manoj Bhagwat Gadekar
(M.A., SET, B.Ed., M. Phil., Ph.D., PGDCA)
Principal

Outward No. SBZMB/SR/2024-25/
Date 16/1/2024

To,

In-Charge

Rambhai Shah Blood Bank,

Barshi. Dist – Solapur

Subject: Regarding permission to visit the Blood Bank for B. Sc. II students on 20/01/24

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Thanking you.

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(Dr. M. B. Gadekar)
PRINCIPAL
Shriman Bhausaheb Zadbuke
Mahavidyal... Solapur

BarshiShikshanPrasarak Mandal's

Shriman Bhausaheb Zadbuke Mahavidyalaya, Barshi

Date :- 18/01/24

Department of Microbiology

Notice

All the students of B. Sc. II (Microbiology) are here by informed that a visit to Rambhai Blood Bank, Barshi has been organized on 20/01/24 at 11 am.

Students are requested to attend this educational tour in scheduled time.

Head of Department

(Dr. Maj. A.P. Nandimath)