A CASE STUDY OF MICROBIAL COLONIES ASSOCIATED WITH NON-RHIZOSPHERE SOIL, RHIZOSPHERE SOIL, RHIZOPLANE AND PHYLLOPLANE OF *AMARANTHUS VIRIDIS* AND *HIBISCUS CANNABINUS* IN RELATION TO FIELD AND MARKET.

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ABSTRACT-The substances like Soil, Rhizosphere, Rhizoplane and Phylloplane are considered as important ecological niches for millions of microorganisms. There are several field problems of crop plants and vegetable plants effecting yield potential which include pests and diseases. Most of the diseases in plants are caused by microorganisms such as fungi, bacteria and actinomycetes. The microorganisms are known to colonize diversified habitats helping in recycling of elements, organic matter and also help in the plant growth and productivity.The substances like Soil, Rhizosphere, Rhizoplane and Phylloplane are considered as important ecological niches for millions of microorganisms. In India the family Malvaceae is represented by 22 genera and 110 species.In India the family Amaranthaceae is represented by 17 genera and 50 species occurring mostly in the warmer parts.Few plants are of medicinal value.There are several field problems of Crop plants and vegetables plants effecting yield potential which include pests and diseases.*Amaranthus viridis* is used as a medicinal herb in traditional Ayurvedic medicine.*Hibiscus cannabinus* is a leafy plant, which has many culinary uses. It is an excellent source of folate and a very good source of vitamin B6. It is a very rich source of Iron, vitamins C, folic acid and anti-oxidants essential for human nutrition.The microbial numbers between the field and market samples of Amaranthus showed higher number of fungal species in the Rhizosphere, and Rhizoplane. The least number of fungal species were observed in the phylloplane compared to Non-Rhizosphere soil. The microbial numbers were high in the Non-Rhizosphere soil of Amaranthus (Market) compared to the Rhizosphere, Rhizoplane and Phylloplane populations.The Bacteria and Actinomycetes populations were higher than the fungal populations.The Microbial numbers were higher in the field compared to the market.The trend was generally from high population levels to the lower population levels during the crop season in the market samples of *Hibiscus cannabinus*.The bacterial populations were higher compared with that of Actinomycetes.

Key words: Rhizoplane, Rhizosphere, Phylloplane, *Amaranthus viridis, Hibiscus cannabinus.*

INTRODUCTION

Leafy vegetable are the major role in human diet they are the rich sources of vitamins, minerals which are essential for human beings .Large number of microorganisms harbour on different parts of the plan. Most plant pathogens affecting vegetable crop species have been reasonably well-studied and information on their biology is availableBalandreau et al (2001). Microbial ecology is an emerging discipline as an integral branch of Microbiology, soil science and Biochemistry. The microorganisms are known to colonize diversified habitats helping in recycling of elements, organic matter and also help in the plant growth and productivity. The substances like Soil, Rhizosphere, Rhizoplane and Phylloplane are considered as important ecological niches for millions of microorganisms. Kumaresan et al (2013) isolated *Aspergillus sp, Curvularia* sp, Penicillium sp on some green leafy vegetables.The phylloplane fungi such as *Fusariumproliferatum* and Fusarium *fumonisins* on garlic plant was reported from Germany, Dugan et al (2003).

The study on Microbial ecology of leafy vegetables in particular *Amaranthus viridis*, *Hibiscus cannabinus*, both are common leafy vegetables which are rich in Iron, Macro and micro nutrients. They are grown widely by the farmers and in kitchen gardens. *Hibiscus cannabinus* belongs to Malvaceae family. In India the family Malvaceae is represented by 22 genera and 110 species. In India the family Amaranthaceae is represented by 17 genera and 50 species occurring mostly in the warmer parts. Few plants are of medicinal value. There are several field problems of Crop plants and vegetables plants effecting yield potential which include pests and diseases.

Most of the diseases in plants are caused by Microorganisms such as fungi, bacteria and Actinomycetes.The aerial and subterranean portions of the plants are known to be congenial sites for the colonization of the microbes.The microbes are known to colonize diverse habitats and substrates including plants.

The present study is aimed atQuantitative estimations of mycoflora. bacteria and actinomycetes from different ecologicalniches viz Soil, Rhizosphere, Rhizoplane and Phylloplane.The study of Microbial ecology of these plants are important as large number of microbes are associated with Soil, Rhizosphere, Rhizoplane and Phylloplane and also helping the soil fertility, transformation of elements, plant nutrition's and plant growth.

Therefore an attempt is made in understanding microbial ecology of Soil, Rhizosphere, Rhizoplane and Phylloplane of *Amaranthus viridis* and *Hibiscus cannabinus*.

Sampling was made at an interval of 20 days from seed to seed and the samples were subjected to microbial analysis. Fungi were isolated using VAM, PSA and specific media were used for bacteria and actinomycetes as they will be estimated quantitatively. The quantitative nature of the microbes in the Soil are subjected to constant state of flux by edaphic, biotic and environmental conditions.Number of these microbes are very important as they are involved in recycling of organic wastes, Carbon, Nitrogen and Phosphorous cycles, Mineralization etc. They are also source of antibiotic, organic and production which are of immense value in human welfare.

The ecological study of soil and microbes attained importance as number of Algae, Fungi, Actinomycetes are rich source of antibiotics and other important organic bye- products.

The extensive studies on Soil, rhizosphere, rhizoplane and phylloplane microflora of different plants revealed diversified mycoflora and microflora differing from plant to plant and region to region. Some new fungal species were identified at regular intervals.

Materials and Method

Amaranthus and Hibiscus cannabinus is a leafy vegetable which is rich in biotin, Iron and other Macro and micronutrients.It is widely grown by the farmers and also in kitchen gardens in warmer climates.

For the present study the plants of *Amaranthus* and *Hibiscus* were raised in the field and compared with the market samples to study the ecology and population dynamics of Fungi, Actinomycetes and Bacteria.

The plant samples were collected at 20 days intervals and were subjected to Fungi were isolated by dilution plate method of Waksman (1952)Warcup,(1950) as described by Johnson and Curl (1972using Potato sucrose medium (PSA),Vegetable agar medium(VAM) and Czpek- Dox agar medium (CZA)Actinomycetes by Glucose yeast extract agar Medium (GYE) bacteria by Beef extract peptone agar medium (BPA)).The identification of mycoflora was done referring standard manuals. Morphology and Taxonomy of Fungi Bessey(1971),An Introduction to Fungi,Dube(1990).

Results and Discussion

The study of quantitative estimations of mycoflora and quantitative estimation of bacteria and actinomycetes from different ecological niches viz., soil, Rhizosphere, Rhizoplane and Phylloplane. The sampling was made at an interval of 20 days.

Table 1 & 2 shows the quantitative estimation of fungi, bacteria and actinomycetes of *Amaranthus viridis* from the field and market.

The microbial numbers within the intervals of samplings showed differences & the values showed that there are significant differences in population levels of fungi, bacteria and actinomycetes.

Microbial Colonies associated with Non- Rhizosphere, Rhizosphere Rhizoplane and Phylloplane from Amaranthus viridis Field and Market

Table:1   Amaranthus viridis Field sample

S.No	Sampling day	Fungi				Bacteria				Actinomycetes			
		NRS	RS	RP	PP	NRS	RS	RP	PP	NRS	RS	RP	PP
1.	20th day	5	8	6	2	2	6	10	9	1	2	5	3
2.	40th day	8	7	4	4	8	8	22	6	6	5	12	6
3.	60th day	4	8	8	6	4	12	18	15	5	9	8	12
4.	80th day	6	7	12	5	19	30	36	12	4	2	20	19
5.	100th day	3	10	5	6	12	40	52	16	2	6	14	27
6.	120th day	5	12	8	5	6	22	32	22	8	8	18	14

Table:2 Amaranthus viridis Market samples

S.No	Sampling day	Fungi				Bacteria				Actinomycetes			
		NRS	RS	RP	PP	NRS	RS	RP	PP	NRS	RS	RP	PP
1.	20th day	4	3	1	2	2	4	8	4	2	2	6	2
2.	40th day	5	7	5	6	4	5	2	9	1	1	5	4
3.	60th day	3	4	2	3	2	8	16	12	1	2	4	10
4.	80th day	2	4	1	2	12	6	12	14	4	8	12	12
5.	100th day	5	2	4	4	13	22	14	8	2	6	10	8
6.	120th day	6	2	3	2	6	14	18	6	2	4	8	2

*NRS - Non-Rhizosphere Soil; RS - Rhizosphere Soil; RP - RhizoPlane ; PP - PhylloPlane

The microbial numbers between the field and market samples of Amaranthus showed higher number of fungal species in the Rhizosphere, and Rhizoplane.The least number of fungal species were observed in the phylloplane compared to Non-Rhizosphere soil. The microbial numbers were high in the Non-Rhizosphere soil of Amaranthus (Market) compared to the Rhizosphere, Rhizoplane and Phylloplane populations. The Bacteria and Actinomycetes populations were higher than the fungal populations.

Table 3 & 4 shows the quantitative estimation of Fungi, Bacteria and Actinomycetes of *Hibiscus cannabinus* from the field and market.

Microbial Colonies associated with Non- Rhizosphere, Rhizosphere Rhizoplane and Phylloplane from Hibiscus cannabinus Field and Market

Table:3 Hibiscus cannabinus Field samples

S.No	Sampling day	Fungi				Bacteria				Actinomycetes			
		NRS	RS	RP	PP	NRS	RS	RP	PP	NRS	RS	RP	PP
1.	20th day	2	6	6	3	4	18	20	21	5	9	12	14
2.	40th day	6	3	2	2	8	20	18	16	2	12	16	12
3.	60th day	8	4	2	3	6	22	55	15	6	6	22	16
4.	80th day	6	8	8	5	14	16	22	18	5	12	16	12
5.	100th day	2	15	10	10	8	12	16	22	3	10	8	10
6.	120th day	5	6	14	7	18	3	14	22	6	5	14	12

Table:4   Hibiscus cannabinus Market samples

S. No	Sampling day	Fungi				Bacteria				Actinomycetes			
		NRS	RS	RP	PP	NRS	RS	RP	PP	NRS	RS	RP	PP
1.	20th day	6	3	4	6	4	14	16	17	2	7	8	10
2.	40th day	5	6	4	3	3	6	15	12	5	6	7	2
3.	60th day	3	4	3	2	6	21	32	5	4	8	6	4
4.	80th day	1	2	2	1	8	18	16	10	3	9	5	12
5.	100th day	2	2	2	1	12	12	12	8	6	8	6	7
6.	120th day	1	1	1	2	4	10	10	12	8	7	3	5

NRS - Non-Rhizosphere Soil; RS - Rhizosphere Soil; RP – RhizoPlane; PP - PhylloPlane

The Microbial numbers were higher in the field compared to the market The trend was generally from high population levels to the lower population levels during the crop season in the market samples of *Hibiscus cannabinus*. The bacterial populations were higher compared with that of Actinomycetes. The results clearly indicate preferences exhibited by the microorganisms to colonize and grow in the rhizosphere soils as the rhizoplane influences the

These microorganisms are causative agents of many diseases to plants, animals and humans. Maximum appearance of saprophytic fungi such as Cladosporium sp, Muor sp ,Rhizopus sp and some imperfecti fungi such as Alternariasp, Aspergillus sp, Fusarium sp, Penicillium sp etc have been reported as most dominant fungi on all the tested vegetable leaves due to the raise in temperature level(33.9oC)

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