



EFFECT OF AQUEOUS FOLIAR SPRAY OF LEAF EXTRACTS OF SOME PLANT SPECIES OF ASTERACEAE ON RUST DISEASE INCIDENCE % OF GROUNDNUT.

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ABSTRACT:

Rust (*Puccinia arachidis* Speg) of ground nut has become one of the serious diseases in India since 1971. It gets spread rapidly through seed/pods contamination; wind borne uredospores. In severe infection condition the crop is completely destroyed. It can be controlled by using rust resistant groundnut varieties and by using chemicals. Farmers have been using synthetic chemicals indiscriminately causing environmental pollution and poisoning nature and food. It is not desirable. This pathogen survives in the plant debris in soil and easily. Rust appears in the field under warm and humid conditions. We tried to investigate fungicidal effect of fresh leaf extracts of ten species of Asteraceae family against phytopathogenic fungi that cause crop plant diseases. According to the Rust disease incidence %, control of the disease could be put in an order of: *Pluchea tomentosa* > *Erigeron bonariensis* > *Synedrella nodiflora* > *Parthenium hysterophorus* > *Launaea procumbens* > *Tagetes erecta* > *Tridax procumbens* > *Sphagnetocola calandulacea* > *Cynathillium cinereum* > mixed > *Eclipta prostrata*

Keywords: *Plant spp. Of Asteraceae family, rust disease of Groundnut, antifungal.*

INTRODUCTION:

Allelopathy is defined as “Chemically elicited interactions among plants mediated by varieties of chemical compounds with different of modes of biochemical actions.” Molisch (1937) introduced the word “Allelopathy” for beneficial as well as harmful (detrimental) reciprocal biochemical interactions among plants including microorganisms. Allelochemicals are the natural secondary metabolites produced by the plants.

With the increase in human population demand for basic needs went on increasing. To meet the demands agricultural techniques, synthetic toxic biocides and synthetic fertilizers have been used to increase the agricultural yields.

Indiscriminate use of these and water resulted in soil and water pollution. Our fertile lands have become non-fertile. Increasing global awareness towards environmental pollution problems has led research workers to find out safe alternatives.

Plants produce varieties of allelochemicals as natural secondary metabolites. These can be used as biocides that are eco-friendly i.e. biodegradable, renewable and abundantly available. There is a vast scope for research in investigating allelochemicals and use them in sustainable agriculture for food production without polluting environment. Plants contain varieties of chemicals that are produced as secondary metabolites. They are natural and

easily biodegraded. Since botanical source of biocides is eco-friendly i.e. biodegradable, renewable and abundantly available, there is a vast scope for research in Allelopathy and investigating allelochemicals and use them in agriculture without polluting environment. The present paper deals with the aspects of fungicidal potentials of weeds of Asteraceae family.

REVIEW OF LITERATURE:

Govindasamy and Balasubramanian (1989) worked on biological control of groundnut disease by using *Trichoderma harzianum* that reduced germination % of uredospores. Govindaswamy (1989) c.f. Rice (1994) worked on controlling 'rust' in *Arachis hypogea* caused by *Puccinia arachidis*. Pre-treatment peanuts with conidia of *Trichoderma harzianum* inhibited germination and germ tube growth of the rust uredospores.

Kishore and Pande (2005) recorded those extracts of *Tagetes patula*, *Cymopsis teragolobus* significantly inhibited the germination of spores of *Puccinia personata* and *P. arachidis*.

Riaz *et al* (2007) conducted experiments to assess effects of leaf residues of plants viz. *Parthenium hysterophorus* L., *Ageratum conyzoides* L. on mycorrhizal colonization and corm rot disease of *Gladiolus* caused by *Fusarium oxysporum f.sp.gladioli* (Massey) Snyder and Hans.

Martyniuk and Bialy (2008) worked on antifungal activity of eight saponins obtained from *Medicago arabica*. Saponins 'hederagenin' with two sugars (glucose and arabinose) had higher antifungal effect than 'hederagenin' with one sugar arabinose. Saponins were inhibitory to *Aspergillus Niger*, *Fusarium oxysporum*, *Pythium aphanidermatum* and *Sclerotium rolfsii*. Faizi *et al* (2008) worked antifungal as well as antibacterial activities of *Tagetes patula*. They isolated flavonoid patuletin which in minimum inhibitory concentration (MIC) inhibited growth of *Staphylococcus* spp., *Streptococcus* spp., *Micrococcus* spp. bacteria. Petroleum ether extract of roots inhibited the fungus *Candida albicans*.

Arslan *et al* (2009) evaluated antifungal activity of extracts of spices against bean rust caused by *Uromyces appendiculatus*. Extracts of Basil, black cumin, black paper, fennel, laurel, parsley, celery and rosemary were tested against the fungal pathogen. Fungicidal activity against bean rust was in an order of: Black cumin (*Nigella sativa* L.) > laurel > Basil > Celery

> black paper > rosemary > fennel > parsley. Rust control efficacy in percentage of Black cumin (85%) was higher while that of Parsley (5.9%) was least.

Arora and Kaushik (2003) recorded that the extracts of *Conyzabon ariensis* (L.) Cronq and *Erigeron karvinskianus* DC. (Family Asteraceae) were highly fungicidal against soybean fungal pathogens viz., *Colletotrichum truncatum* (Schwein) Andrus & Moore, *Fusarium oxysporum* Schl. ex Fr. and *Macrophomina phaseolina* (Tassi) Goid.

Chuihua *et al.* (2004) found out that *Ageratum conyzoides* L., (Asteraceae family) contains allelopathins like 3-caryophyllene, p-bisabolene and p-farnescene that could exert synergistic inhibitory effect on test plants. It is herbicidal as well as fungicidal.

Patil and Kamble (2015) recorded that leaf extracts of *Eupatorium odoratum*, *Blumea balsminifera*, *Cassia tora* L., *Vitex negundo*, *Xanthium indicum* and *Hyptis suaveolens* inhibited spore germination of *Puccinia arachidis* Speg.

MATERIAL AND METHOD:

Study area: Ahmednagar district is the largest district of Maharashtra state. It is located between 18°2' and 75°5' North latitude and 70°9' and 75°5' East longitude. The Sahyadri has formed a naturally boundaries in between Ahmednagar, Thane and Nasik District. Balaghat is the prominent ranges of Sahyadri that traverse the district. Plant species were identified by using Flora of Maharashtra, Almeida (2001).

Groundnut 'HB11' variety of Mahadhan Pvt. Ltd. company, Indore (India) was sown in the field in Shendi village near Ahmednagar city in the month of April 2018. Spraying of extracts was started 30 DAS (days after sowing). 40% leaf extracts of ten selected plant species of Asteraceae were prepared. 40% mixture of all leaf extracts was also prepared. Spraying was done in the morning regularly from 30 to 70 DAS. Control plants were sprayed with pure water. Readings were taken, tabulated and disease incidence %, rust incidence % were calculated (**Table 1 and Graph 1**).

RESULTS AND DISCUSSION:

***Cynathillium cinereum* (L.) H. Rob.** reduced rust disease incidence % from 11.82 to 1.98 i.e. by 9.84%.

***Sphagneticola calandulacea* (L.)** Pruskireduced the rust disease incidence % from 14.98 to 5.53 i.e. by 9.45%.

***Erigeron bonariensis* Linn.** reduced the rust disease incidence from % 9.64 to 3.06 i.e. by 6.58%.

***Launaea procumbens* (Roxb.) Ramayya & Rajgopal** reduced the rust disease incidence % from 12.32 to 4.43 i.e. by 7.89%.

***Tridax procumbens* (L.) L** reduced the rust disease incidence % from 11.39 to 2.82 i.e. by 8.57%.

***Pluchea tomentosa* DC** reduced the rust disease incidence % from 13.11 to 8.90 i.e. by 4.21%.

***Tagetes erecta* L** reduced the rust disease incidence % from 11.00 to 2.82 i.e. by 8.18%.

***Parthenium hysterophorus* L** reduced the rust disease incidence % from 12.54 to 4.76 i.e. by 7.78%.

***Synedrella nodiflora* (Linn.) Gaertn.** reduced the rust disease incidence % from 13.50 to 1.98 i.e. by 6.97%.

***Eclipta prostrata* (Linn.) L** reduced the rust disease incidence % from 16.67 to 1.49 i.e. by 15.18%.

Effect of mixed extracts of ten plants rust disease incidence % : When sprayed on the ground nut crop 30 Days to 70 Days period three times per week mixed leaf extracts reduced the rust disease incidence % 13.15 to 0.23 i.e. by 12.9%.

'Rust disease incidence %' of the disease by plant species was in an order of: ***Eclipta prostrata* > mixed > *Cynathillium cinereum* > *Sphagneticola calandulacea* > *Tridax procumbens* > *Tagetes erecta* > *Launaea procumbens* > *Parthenium hysterophorus* > *Synedrella nodiflora* > *Erigeron bonariensis* > *Pluchea tomentosa*** (Table 1, Graph 1). More reduction in disease incidence by *Eclipta prostrata* and less by *Pluchea tomentosa*.

For controlling rust, tikka and other fungal diseases of groundnut (*Arachis hypogea* L.), one of valuable commodity of the crops

grown for seeds, oil and fodder crop, synthetic fungicides like Apropr, Bumper, Orius, Plethora, Benamain and Mainex are being used by the farmers. To save poisoning and deteriorating soil, underground water by using hazardous non-biodegradable synthetic fungicides, it is desirable to control fungal diseases using natural, easily biodegradable plant originated fungicides. Compositae (Asteraceae) is a cosmopolitan family. It is one of the dominant families of flowering plants. Majority grow in wild nature. They are easily available. Many workers have been doing research on the species to find out their efficacy of biocidal (fungicide / insecticide / nematicide etc.) nature.

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Table No 1: Effect of foliar spray of leaf extracts of Asteraceae plants on Rust disease incidence% of groundnut.

Spraying extract of plant species	30DAYS	40DAYS	50DAYS	60DAYS	70DAYS
Control No spraying	26.55	25.68	17.97	14.69	16.37
<i>Pluchea tomentosa</i> DC.	13.11	12.6	12.48	9.63	8.9
<i>Synedrella nodiflora</i> (Linn.)Gaertn.	13.5	11.45	11.72	8.45	6.53
<i>Erigeron bonariensis</i> Linn.	9.64	8.13	5.37	4.01	3.06
<i>Cyanthillium cinereum</i> (L.)H.Rob.	11.82	1023	10	7.26	1.98
<i>Parthenium hysterophorus</i> L.	12.54	9.91	8.73	5.56	4.76
<i>Sphagneticola calendulacea</i> (L.)Pruski.	14.98	10.57	10.5	6.7	5.53
Mixed spray	13.15	13.39	2.95	0.65	0.23
<i>Launaea procumbens</i> (Roxb.)Ramayya & Rajgopal.	12.32	11.94	11.64	8.29	4.43
<i>Tagetes erecta</i> L.	11	10.69	5.81	3.14	2.82
<i>Tridax procumbens</i> (L.)L.	11.39	10.24	4.84	3.86	2.82
<i>Eclipta prostrata</i> (Linn.)L.	16.67	15.18	12.04	5.15	1.49

Graph-1: Effect of leaf extracts of plant species of Asteraceae on rust incidence %

