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Effect of Medicinal Plants and Antagonistson Seed Mycoflora, Seed Germination and Vigour Index of Sunflower

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Abstract: *Sunflower (Helianthus annus L.)seeds were treated with fungal and bacterial antagonists. The seeds were soaked in fungal spores the bacterial suspension for 15 minutes. The treated seeds were incubated for 7-8 days. The percentage incidence of mycoflora, percentage of seed germination and vigour index were calculated in treated and controlled seeds. In treated seeds the percentage incidence of seed mycoflora decrease whereas percentage of seed germination and vigour index increases as compaired to control. The seeds are treated with biocontrol agent like Trichodermaharzianum, Trichodermaviride, Pseudomonas fluorescens and Bacillus subtilis, Among these Trichodermaharzianum and pseudomonas fluorescens were most effective. The seeds were also treated with plant extracts like AdirachtaindicaA. Juss., Ocimum sanctum L., Withaniasomnifera(L) Dunal, Polyalthialongifolia (sonner), Lantana camera (L). And Zingiberofficinale(Rosc.). Among these effective AdirachtaindicaA. Juss., was more effective than other plants.*

Keywords: Sunflower, Medicinal plants, Antagonists, Mycoflora, Vigour index

I. INTRODUCTION

India is striving hard to increase agricultural production with a view to accelerate food production to feed the ever increasing population though an integrated approach towards the application of farm technology (Neergaard, 1970; Dharamvir, 1974).Seed play an important role in disseminating pathogenic organism to areas from hitherto, they have been absent. To check the spreads of such pathogen, seed health testing procedure is necessary.

India is the third largest producer of oil seeds in the world. It ranks first in the production of ground nut and sesame. Oil seeds are grown in an area about 20 million hectares of which nearly 84% areas is rain fed. The vegetable oil is obtained from oil seed crop like sunflower.

About 90-95% areas under Oil seeds remain rain fed of which about 80% area comes under dry land where irrigation facilities do not exist at all. It has been observed that often absence of rains at critical growth stages of kharif oil seed crops, before maturity, causes significant reduction in yields and oil content.

Fats and oil are important ingredients of human food. Vegetable oil is extracted from seeds and fruits of different crops and trees.(Butt & Ali,2005). Sunflower (***Helianthus annuus*** L.) an important member of the family Asteraceaeand is one of the major oil seed crops grown for edible oil in the world (Anon, 2007).

In India sunflower is an important oil seed crop popularly known as 'Surajmukhi . It is one of the fastest growing oil seed crop in India. Sunflower was introduced in India as an oil seed crop for the first time in 1969. It is a drought tolerant crop due to it's deep taproot, therefore, it is best substitute to all rain feed commercial crop.

Indian sunflower seed production ranges between 10-15 lakh tonns. The major producer states are Karnataka (35%), Andhra Pradesh (30%),Maharashtra (15%),Panjab (4%) and Haryana (4%).Sunflower seeds contain 40-50% oil, 23% protein and constitute excellent source of unsaturated fats, crude protein and fibre and important nutrients like vitamin E, Copper, Zinc, Selenium, B-Complex vitamin.

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Seeds are generally associated with certain saprophytic or parasitic micro-organisms which perpetuate in the seed lots on the advent of favourable conditions. Seeds are associated with pathogens like fungi, bacteria, nematodes etc. Pathogens present in almost any seed lot of economically important crop which may be disastrous if introduced into disease free areas. Therefore, seed must be "Substantially free" from inoculum with high level of germination and purity before sowing.

According to recent report of the World Health Organization (WHO), 1-4 % of the world's grain production is lost due to microbial spoilage.

Sunflower seed constitute an essential components of agriculture.About 90 percent of all food crop are propagated through seeds. They act as passive carries of fungi, bacteria, viruses and nematodes.

Bakers (1972) defined seed borne pathogens and a large number of pathogens belonging to 90 fungal and 5 bacterial genera are seed transmitted (Phatak, 1980 and Tomlinson, 1987). Among the various microorganisms associated with seeds, fungi play an important role in determining the quality of grains and seeds (Mirocha et al., 1976, Dennis, 1977 and Gupta, 1994).

Seed borne microorganisms considerably effect agricultural production in the field as well as reduce storage life of seed. In several cases such mycoflora is found to affect adversely the seed germination, vigour quality and quantity of oil. (ward and Diener,1961;Kadian and Suryanarayana,1972).

All India coordinated Research Project (AICRP) under Indian Agricultural Research Institute (IARI) has carried out interdisciplinary multilocational research since 1967, gradually leads to the standardization of appropriate production technology for different agro-ecological conditions. Accordingly, Indian agro-ecological condition has been divided into five zones i.e. Northern hill zone, Northern plane zone, Central zone, Southern zone and North-Eastern zone.

In the process of seed bio-deterioration the moulds have been found to cause qualitative and quantative changes in chemical composition of the seed poisoning food and making them unsuitable for human and animal consumption. production of enzymes and toxins by the moulds have been found to be correlated with the degree of bio-detrrioration. The major post-harvest bio-deterioration of sunflower was found to be fungi,which results in decrease germination . Hence an attempt has been made to increase the seed germination.

The seeds are treated with biocontrol agent like ***Trichodermaharzianum***, ***Trichodermaviride***, ***Pseudomonas fluorescens*** and ***Bacillus subtilis***, Among these ***Trichodermaharzianum*** and ***pseudomonas fluorescens*** were most effective.

The seeds were also treated with plant extracts like ***Adirachtaindica***A. Juss.**,** ***Ocimum sanctum*** L. **,*Withaniasomnifera***(L.) Dunal**.** ***Polyalthialongifolia*****(**sonner.**),** ***Lantana camera(***L**).** And ***Zingiberofficinale*** **(**Rosc.) . Among these effective ***Adirachtaindica***A. Juss.**,** was more effective than other plants.

II. Material and Methods

Sunflower seeds were treated with fungal and bacterial antagonists. The seeds were soaked in fungal spores and bacterial suspension for 15 minutes. The treated seeds were incubated for 7-8 days. The percentage incidence of mycoflora, percentage of seed germination and vigour index were calculated in treated and controlled seeds. In treated seeds the percentage incidence of seed mycoflora decreases whereas of seed germination and vigour index increases as compaired to control. Seeds were treated with antagonists fungi and bacteria. The antagonist fungi like ***Trichoderma*** species. The antagonists bacteria used were ***Bacillus subtilis*** and ***pseudomonas fluorescens***.

2.1 Seed treatment with *Trichodermaspecies*

200 g of seeds were coated with 100mL aqueous spore suspension of ***Trichoderma species*** (8×10^9 spores/mL) by adding 1 mL of 0.5% carboxyl methyl cellulose (CMC) as sticker and 20 g of Bentonite powder as filler for seed dressing. Treated seeds were incubated for 7-8 days. The percent incidence of fungi, seed germination and vigour index were observed in seed samples.

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2.2 Seed treatment with *Bacterial species*

The method of Weller and Cook (1983) was followed for seed bacterization. ***Pseudomonas fluorescens*** and ***Bacillussubtilis*** were separately grown in succinate broth for 24 hours at 28±1^{0}C under shaking condition and finally centrifuged at 7000 rpm for 15 minutes at 4^{0}C. The supernatant was discarded and pellets were washed with SDW and resuspended to obtain a population density of 10^7cfu/mL. This suspension was mixed with 1% carboxyl methyl cellulose (CMC). Seeds were allowed to air dry overnight under aseptic condition after coating with CMC slurry of bacterial culture. Care was taken to avoid clumping of seeds. Seeds coated with slurry of CMC (without bacteria) served as control. The seeds were incubated on sterile blotter paper. The percent mycoflora, seed germination and vigour index were observed in seed samples.

2.3 Effect of plant extract on seed mycoflora, seed germination and vigourindex:

During the present study six common plants namely ***Azadirachtaindica***A. Juss.,***Ocimum sanctum*** **L.,** ***Withaniasomnifera***(L.) Dunal, ***Polyalthialongifolia*** (sonner). Thw ***;Lantana camera*** (L.) ***Zingiberofficinale***(Rosc.). were selected. The identification of plants was confirmed using the flora of Marathwada (Naik, 1998). These plants were surface sterilized with 0.1% $HgCl_2$ and washed repeatedly with sterile distilled water for three times. The different concentrations prepared for seed treatment were from 1-10%.

III. Results and Discussion

Table 1: Effect of antagonists on seed mycoflora, seed germination and vigour index of Sunflower Cv. Morden

Sr. No	Antagonists	Seed mycoflora (%)			Seed germination	Vigour index
		A.flavus	*F.monili forme*	*A.alternata*		
1	*T.harzianum*	6	4	3	70	840
2	*T.viride*	7	5	5	65	800
3	*P.fluorescence*	8	6	6	67	700
4	*B.subtilis*	9	8	7	60	600
5	Control	70	50	40	55	150
	S.E ±	11.21	7.95	6.25	2.38	11.38
	C.D at P=0.01	51.56	36.57	28.79	10.94	512.34
	C.D AT P=0.05	31.16	22.10	17.37	6.61	309.37

The table clear that after seed treatment of antagonists the percentage incidence of mycoflora decreases where as percentage of vigour index increases. The maximum inhibition of percentage of fungi was done by ***Trichodermaharzanium*** as compair with other antagonists all bio control agent are effective.

Table 2: Effect of *Azadirachtaindica*A. Juss. On seed mycoflora, seed germination and vigour index of Sunflower Cv. Morden.

Leaf extract Conc. (%)	Seed mycoflora (%)	Seed germination (%)	Vigour index
0.00 (Control)	80	65	160
1.0	77	70	170
2.0	75	73	210
3.0	70	75	250
4.0	60	77	300
5.0	50	80	415
6.0	40	85	550
7.0	30	88	610

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8.0	20	90	750
9.0	10	92	775
10.0	00	94	820
S.E. ±	8.20	2.77	73.99
C.D. at 5%	18.28	6.17	164.99

From the Table 2 it can be concluded that of ***Azadirachtaindica*** A. Jussat 10% concentration the seed mycoflora decreases upto 00% over control 80%. At the same concentration, seed germination and vigour index were found to be 94% and 820 respectively. In control on the contrary, seed germination and vigour index were 65% and 160 respectively.

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