SCLEROTIAL POPULATION OF *MACROPHOMINA PHASEOLINA* (CAUSE OF SUNFLOWER CHARCOAL ROT) IN BARANI AREA SOILS OF PUNJAB, PAKISTAN.

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SUMMARY

Efforts are underway to introduce sunflower as an oilseed crop in barani areas of Punjab. Charcoal rot caused by *Macrophomina phaseolina* has appeared as a devastating disease in experimental fields. Therefore, a survey of prospective barani areas was conducted to determine the population of the pathogen in the soil. Samples of soil collected from different fields (sunflower, millet, peanut, fallow) of fourteen selected key locations were plated on a selective medium (Chloroneb-Mercuric chloride-Rosebengal Agar) and viable sclerotial population enumerated. All the key locations have shown the presence of viable sclerotia of the fungus suggesting possible infection of the sunflower crop by the pathogen on introduction in these areas. Overall viable sclerotial population ranged from 0.4 sclerotia per gram of soil in a millet field at Shahpoor to 25 sclerotia per gram of soil in a sunflower field at Islamabad. Sunflower fields in general had significantly higher sclerotial population than any other type of field. This study stresses the need for concerted work on resistance against charcoal rot before release of sunflower varieties to farmers in these areas.

INTRODUCTION

Macrophomina phaseolina causes charcoal rot in more than 400 species including sunflower. This fungus produces sclerotia in root and stem tissue of its host which enables it to survive in soil (Bhattacharya and Samaddar,1976; Meyer et al,1974). These sclerotia constitute the primary inoculum and are present freely in the upper layer of soil.

Sunflower ranks second to soybean in world wide vegetable oil production. Since its introduction in Pakistan in the 1960's sunflower is being grown on a limited scale as work is still being done on its production technology. Very little was known about the pathological problems associated with this crop. Charcoal rot of sunflower appeared in 1984 inflicting heavy losses in sunflower growing in arid areas.(Hoes, 1984)

As efforts are under way to introduce sunflower as an oilseed crop in the barani areas a survey of the prospective areas of Punjab was conducted to determine the sclerotial population of the pathogen in the soil.

MATERIALS AND METHODS

Collection of soil samples: Sampling for the determination of sclerotial population of *M.phaseolina* was done from selected key locations in the barani areas of Punjab (fig 1). Five soil samples were taken from each site with the help of soil sampler

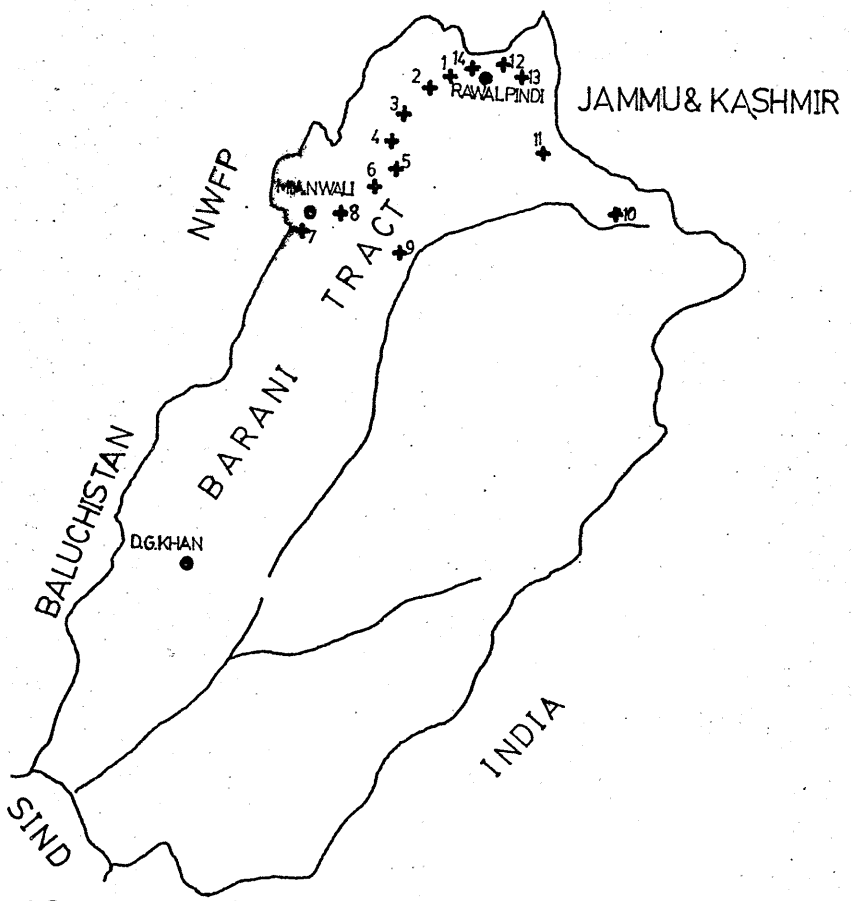

FIG.1
MAP SHOWING LOCATIONS (+) SAMPLED FOR *Macrophomina phaseolina* POPULATION IN THE PROSPECTIVE SUNFLOWER GROWING AREA IN BARANI TRACT OF PUNJAB, PAKISTAN.

and pooled togather. Air dried samples were passed through a 10 mesh screen and three 5 gms samples were taken at random from each lot.

Determination of sclerotial population in the soil: The number of sclerotia in the soil was determined by the method used by Short et al (1980). Each 5 gms portion of air dried soil was suspended for 10 minutes in 1% Sodium hypochlorite (NaOCl) by three comminutions (each 10 sec. in duration at 5 min. intervals) in a blender. This treatment killed the mycelial tissue and left the sclerotia unharmed (Short et al,1978). The soil preparation was poured on to a 44m (325 mesh) sieve and washed with distilled water for 2-3 min. The washed residue on the sieve was transferred into molten Chloroneb-Mercuric Chloride Rosebengal Agar (CMRA) at 45°C, agitated and immediately poured into 10 Petri dishes. The dishes were incubated in dark at 33°C for one week and examined for colonies of *M.phaseolina*. Total number of colonies per 5 gms of soil was recorded. Data was expressed as number of viable sclerotia per gram of soil.

RESULTS AND DISCUSSION

In total fourteen key locations were visited and sampled (fig 1). Soil samples from all key locations revealed the presence of viable sclerotia of *M.phaseolina* (table 1). The overall mean viable sclerotial population ranged from 0.4 sclerotia per gm. of soil in a millet field at Shahpoor to 25 sclerotia per gm of soil in a sunflower field at Islamabad. Sunflower fields in general had significantly higher sclerotial population than any other type of field.

TABLE 1. SCLEROTIAL POPULATION OF *Macrophomina phaseolina* IN BARANI AREA SOILS OF PUNJAB,PAKISTAN.

NO	KEY LOCATION	TYPE OF FIELD	VIABLE SCLEROTIA (NO/G SOIL)
1	MANGIAL	SUNFLOWER	3.8
2	GAGAN	SUNFLOWERR	14.4
3	MIANWALA	FALLOW	0.6
4	DHULIAN	FALLOW	1.8
5	KOT SARANG	MILLET+PEANUT	0.53
6	BIDDAR	MILLET	4.2
7	KUNDIAN	MILLET	2.5
8	MUSA KHEL	FALLOW	1.0
9	SHAH POOR	MILLET	0.4
10	GUJRAT	MILLET	4.06
11	DINA	MILLET	1.9
12	PUNJGRAN	SUNFLOWER	18.1
13	TARLAI	SUNFLOWER	16.2
14	NARC	SUNFLOWER	25.2

The fact that *M.phaseolina* has a wide host range and that its presence has been demonstrated at all key locations in the barani areas, emphasizes the need for development of resistant sunflower varieties before attempting its large scale introduction in these

areas. In our studies on screening of exotic and local germplasm/varieties against charcoal rot, hybrid NK 212 has consistently appeared tolerant to *M.phaseolina* and is now being recommended for cultivation in barani areas. *M.phaseolina* is also seed borne (Gangopadhyay et al,1970) and in our studies different seed lots have shown an infection ranging from 0-10%. Provision of certified clean seed treated with suitable fungicides will not only provide protection against charcoal rot but also against other seed borne pathogens as well. This will also help in checking the transfer of aggressive strains of *M.phaseolina* among different localities; isolates from different areas have exhibited considerable pathogenic variation in another study (Ahmad,personal communication).

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