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Study on Charcoal Rot of Maize

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Abstract – The current examination was intended to distinguish obstruction in tip top sunflower genotypes against charcoal decay illness for assortment improvement program. Sixteen sunflower genotypes were chosen to check the illness seriousness of charcoal decay. It was uncovered that all the genotypes were powerless to charcoal decay infection. The genotype 14068 was profoundly defenseless against the infection with high decrease in yield; be that as it may, genotypes 14013, 14052, 14082 and 14095 were safe against the sickness dependent on rating scale and brought about high return in parched area of Bahawalpur. Safe genotypes should be chosen in reproducing system to deliver new sunflower lines exceptionally safe against charcoal decay to take care of truly expanding populace of the world.

Keywords – Charcoal, Rot

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INTRODUCTION

Maize (Zea mays L.) is a huge grain plant trained by native individuals in Mesoamerica in ancient time. It is best filled in warm, tropical locales as it requires warm soil to grow ideally. It is a yearly grass having a place with Poaceae and is a staple food crop developed everywhere on the world. It is additionally generally developed as a feed for animals. A particularly significant yield experiences numerous parasitic infections, for example, basic filth brought about by Ustilago maydis (de Candole) Corda, head muck brought about by Sphacelotheca reiliana (Kunhn) Clinton, earthy colored decay brought about by Physoderma zeae maydis F. J. Shaw, rust brought about by Puccinia sorghi Schw., leaf curse brought about by Exserohilum turcicum (Pass.) Leonard et Suggs. Seedling scourge and shrink caused Fusarium moniliforme var. subglutinans Wollenw and Reinking, seedling scourge and top decay brought about by Giberella zeae (Schwein) Petch, Charcoal decay brought about by Macrophomina phaseolina (Tassi.) Goid.

Among these charcoal decay brought about by Macrophomina phaseolina (Tassi.) Goid. is intense. Foundation of fungicide obstruction in pathogenic growths is intense one. In Indian agribusiness, because of inappropriate information on ranchers most extreme fungicides are utilized for crop sickness the executives. The rehashed utilization of such fungicides results in to improvement of fungicide obstruction in pathogenic parasites. Notwithstanding, in India. There are a few reports expressing fungicide obstruction in pathogenic growths.

The charcoal decay perseveres in soil as microsclerotia, which are conservative (100-400µm) masses of dim hyphen that can endure negative climate condition. The influenced plants show shriveling indications. The tail of the contaminated plants can be perceived by grayish streak. The substance becomes destroyed and grayish dark moment sclerotic create alongside the vascular groups. Destroying of the inside of the tail frequently makes tail break in the district of the crown (become dim in shading) destroying of root bark and crumbling of root framework are the normal highlights. This infection is overseen by utilizing various fungicides. Be that as it may, utilization of fungicides is making issue of obstruction in contagious microbes.

Kaiser and Das (2014) contemplated impact of actual elements on the development and spread of Macrophomina phaseolina (Tassi.) Goid., causing charcoal decay of maize. Gangawane and Kamble (2015) revealed synergistic impacts of fungicides on the carbendazim obstruction in Macrophomina phaseolina (Tassi.) Goid., causing charcoal decay of potato. Additionally, Wadikar and Kamble (2016) gave the executives of charcoal decay of pigeon pea through protoplast combination between carbendazim delicate and safe disconnects of Macrophomina phaseolina (Tassi.) Goid. To deal with the sickness following destinations were remembered.

OBJECTIVES:

1. To determine minimum inhibitory concentration of carbendazim against

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Macrophomina phaseolina (Tassi.) Goid., causing charcoal rot of maize.

2. Biocontrol of charcoal rot of maize by using Trichoderma species.

The pathogen and Economic importance:

Root and tail illnesses of sorghum are brought about by a few soil borne microbes seeming both in kharif and rabi seasons. The significant microbes in their transcendence of relationship in India are Macrophomina phaseolina, Fusarium moniliforme, Fusarium spp" Colletotrichum graminicola and Erwinia carotovora. The illnesses brought about by these creatures are typically alluded as charcoal decay, tail decay, root decay, red decay, and so forth, contingent on the microorganism in question and side effects delivered. Among these, Macrophomina phaseolin a causing charcoal decay is overwhelming.

Management of charcoal Rot of sorghum.

Exploration on distinguishing and creating safe genotypes is in advancement in numerous pieces of the world. Legacy of protection from this sickness has been worked in Rabi genotypes. The examination showed predominance of vulnerability which is constrained by a bunch of 5 sets of qualities with 2 sets of qualities normal to the guardians of the two crosses along these lines displaying separate triennia proportions relying upon the guardians engaged with the cross. For creating safe genotypes two significant pre necessities are wellspring of opposition and legitimate screening technique. Despite the fact that tooth pick technique (Hsi, 1961) and stem tape inoculative strategy can be utilized effectively, the most down to earth and exceptionally reliable technique is debilitated plot strategy utilizing defenseless check assortment Spy - 86 or crossover like CSH-6. Nonetheless, of late it was discovered that utilization of wiped out plot strategy has not filled the need of uniform conveyance (inoculums thickness) of the inoculums over whole debilitated plot. Thus, presently alongside wiped out plot method for cutting edge screening material f safe nursery material tooth pick procedure was likewise followed, not to lose information age on this esteemed material in composed software engineer.

The consequences of screening have indicated a few safe genotypes among which E-36-1 has been discovered to be steady. A few neighborhood genotypes gathered in Kamataka viz., Bidar nearby, Chitapur nearby, Kandkur nearby, Karmoli neighborhood, Muddebihal nearby, Houuntagi neighborhood and so on, were likewise answered to be safe for charcoal decay (Jahagirdar et al., 2017). Jahagirdar et al (2013) announced IUS line promising for charcoal decay resistnce in sorghum. Reproducing for protection from charcoal decay has been in advancement m Maharastra and Karnataka. From UAS Dharwad focus DSV 4 and DSV 5 were delivered as charcoal decay safe cultivars during 1995-96. In reproducing fot opposition developer at Bijapur focus four crosses were made I) 9-13X RSLG 262 II) BRJ 356X E 36-1 III) GRS 1XE 36-1 IV) 9-13X E 36-1. The material created is currently in F2 stage. The significant accentuation in choice of above said crosses was to raise for charcoal decay obstruction alongside advancement of genotypes for protection from terminal pressure. Another arrangement of material was created back intersection with M 35-1 with Fl of above said crosses. A couple of laborers have endeavored natural control of this infection. Albeit the bivalents viz., T. viride and other parasitic species have been discovered viable in lab and pot conditions, their prosperity rate was restricted under field conditions with powerless genotype. Nonetheless, under foundation of decently safe genotypes like 9-13 and GRS 1, seed treatment with Trichoderma was discovered viable in cutting down rate level further with utilization of suggested measurement of FYM at the hour of planting. (J ahagirdar et at., 2001). In any case. There is a requirement for assessment of populace elements of both microorganism and presented bioagent. It was additionally proposed to utilize local bioagent than business bioagents.

Late wilt of maize

Late wilt or black bundle disease of corn caused by the soil-borne and seed-borne fungus, Harpophora maydis with synonyms Cephalosporium maydis (Samra, Sabet and Hingorani) and Acremonium maydis This disease was first reported as a vascular wilt disease of corn in Egypt in 1960 and was isolated from the roots and stems of wilting maize. The only reported hosts of H. maydis are corn lupine.

Charcoal rot

The charcoal decay of maize, brought about by Macrophomina phaseolina (Tassi) Goid, is a significant sickness of this harvest (Shekhar, 2014; Gill et al, 2015; Shekhar et al, 2016). The microbe is accounted for to taint almost 500 types of plants in tropical and subtropical nations (Figure 3; Ghaffar, 2014). The microbe creates various dark sclerotia on unhealthy plant parts, which are globular to unpredictable

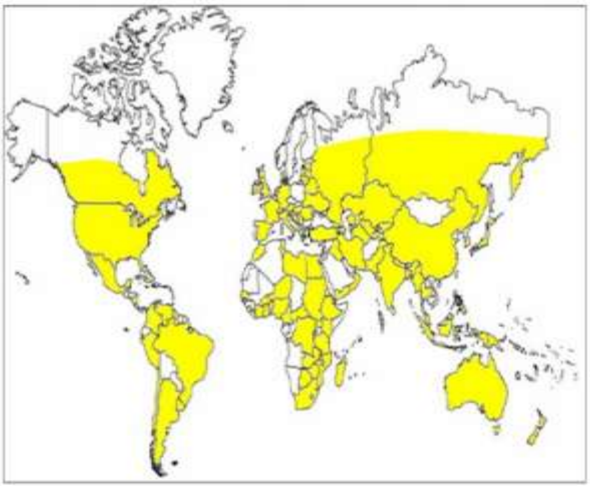

Figure 1 - Geographical distributions of charcoal rot of maize. courtesy: CIMMYT 2014.

And in form. The fungus, characterized by sclerotial size and the presence or absence of pycnidia, is composed of several strains. The sclerotial and mycelial process of M is known to be rhizoctonia bataticola. With phaseolina (Malcom, 2015). In India, during the 1960 Kharif season in the Kashmir valley, the charcoal rot disease was observed in an epidemic form. It was later observed during the rabi season of 1965-66 in Hyderabad (Andhra Pradesh) and in 1966 in Pantnagar (Uttar Pradesh) in Kharifa (Payak and Renfro, 2014). In Jammu and Kashmir, Punjab, Haryana, Delhi, Rajasthan, Madhya Pradesh, Uttar Pradesh, Bihar, Andhra Pradesh, Tamil Nadu Karnataka and West Bengal, this disease has also been found to be widespread (Kaiser, 1982).

Symptoms

There are a number of signs of the disease, ranging from seedling blight, stalk rot, roots, and kernels. It also causes brown, water-soaked lesions on the roots that turn black later (Kumar and Shekhar, 2015). The fungus extends through the lower internodes of the stalk as the plants grow, causing the crown to ripen, shred and split prematurely. Numerous black sclerotia on the vascular strands give a charred look to the internal stalks (Malcom, 2017; Kaur et al, 2018). Sclerotia can be located just under the surface of the stalk and on the roots. The fungus even infects the kernels, leaving them fully black (Prakasam et al, 2014; Shekhar et al, 2016). The fungus was intracellular as well as intercellular, entering through the root epidermis. In roots, hyphal colonization was typically much greater than in stalks. Gum deposition has been observed in root cortical tissues.

Impact of the disease

The maize charcoal rot caused by M. Phaseolina has been reported to cause significant grain yield losses in the 25-32.2 percent range and degradation in fodder quality from Kano, Nigeria, stated that major yield loss was caused by charcoal rot. Three factors were recognized in crop losses: I loss of grain yield and quality due to stiltedness of premature drying stalks; ii) loss of yield due to plant lodging; iii) loss of quantity and quality of fodder due to pathogen infection and degradation of stalks. It has been estimated that the yield reduction in the susceptible maize genotype due to this disease is 39.5%. Yield declines have been reported to be as high as 63.5 per cent in recent years. 85.5 percent yield reduction over control observed in artificial inoculation studies with susceptible varieties.

The pathogen

M. Phaseolina (Tassi) Goid (Tiarosporella phaseolina, Macrophoma phaseoli, and Rhizoctonia lamellifera are various synonyms) is an anamorphic ascomycete of the Botryosphaeri-aceae family and induces charcoal rot on a wide variety of plants in many areas of the world. Over the years, the absence of a recognised teleomorph has stalled its taxonomy however, the genera Macrophomina and Tiarosporella were distinguished by a detailed phylogenetic analysis of 113 members of the Botryosphaeriaceae family using ribosomal DNA sequences. Even though M. It is also an opportunistic human pathogen (Tan and, so far, the strains that infect plants and humans tend to be quite similar.

Epidemiology of charcoal rot

Pathogen-induced diseases are more prevalent in high soil temperature conditions of 30 - 42 °C, low soil moisture and low soil pH (5.4 - 6.0) or when plants are under water stress. In causing the disease, the sclerotial and mycelial inoculum was equally successful. In maize, under high temperatures and low humidity, the charcoal rot disease is reported to develop very quickly (McLean and Cook, 1965). In the post-flowering stage of maize, water stress and high soil temperatures are reported to increase the symptoms of charcoal rot A high degree of disease incidence at the grain filling stage has been shown by the majority of commercially grown cultivars.

Factors affecting the infection and severity of the charcoal rot

Root infection of the disease is affected by the stage and environment of development. Prior to reproductive growth, high root infection may occur and is then associated with hot and dry weather early in the growing season. M. Phaseolina can also, under relatively dry conditions, infect beans. There are also records, however, where a high capacity for moisture keeping (40-50 percent MHC) resulted in greater M. Phaseolina of peanut colonization.

A important synergistic effect was documented in soybeans when Meloidogyne incognita rootknot nematode preceded infection with M. Phaseolina for three weeks, indicating that M. Similar to the vascular pathogens Fusarium oxysporum and Verticillium dahliae, Incognita predisposes plants to fungal infection. Wearing a white clover, M. Phaseolina also appears to be associated with higher final densities of Meloidogyne trifoliophila, Helicotylenchus dihystera, and Heterodera trifolii plant pathogenic nematodes. In comparison, the simultaneous addition of M. in a pot experiment. The effect of the toxic metabolites on the nematode produced by the fungus was attributed to phsaeolina and Meloidogyne javanica, which resulted in reduced nematode galls.

Many studies have shown that there is no consistent link between the magnitude of the host infection and the occurrence of charcoal rot. Under conditions that minimise plant vigour, such as poor soil fertility high seeding rates low soil water content high temperatures, noticeable symptoms of the disease in the field are most evident The timing of host reproduction is another factor that has a strong impact on the development of charcoal rot. Early flowering plants in Euphorbia lathyris succumb more rapidly to charcoal rot than later flowering ones In sorghum, water-stressed plants after flowering displayed more serious symptoms of charcoal rot than plants without water stress The initial soil sclerotia population density was positively correlated with the magnitude of soybean charcoal rot and was inversely associated with soybean yield found that with rising soil temperature, average symptom expression and mortality increased and that mortality increased markedly after the soil temperature entered the range of 28-30 ° C at 5 cm.

CONCLUSIONS

In order to better understand and monitor PFSR using both traditional and modern technology, we have highlighted the progress made by various organisations. These innovations provide the agricultural sector with useful tools and services and can contribute to the yield and sustainability of the world's maize production. In tropical countries, post-flowering stalk rots cause comparatively greater damage compared to temperate countries. A permanent wilting is caused by the pathogen, where leaves become flabby, basal stalk tissues turn to colorations of pinkish to purple tinge. At or after the blooming stage, late wilt kills the plant prematurely. Infected plants are dull green at first, then yellow and dry finally. The lower internodes become dry, shrunken and hollow in the advanced stages. In the warm and dry areas of the globe, charcoal rot is a widespread stalk rot disease. It occurs in areas where, at or after flowering, drought conditions typically prevail. The disease is promoted by elevated soil temperatures ranging from 30 ° C to 42 ° C and low soil humidity. As sclerotia in soil, the pathogen overwinters and can penetrate roots and lower stems during the season's development. The presence of numerous, minute and black sclerotia, particularly on the vascular bundles and outside the rind of the stalk, is a characteristic sign. The outer rind and pith tissues in the diseased plants are rotten, while the vascular bundles remain intact.

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