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STUDIES ON PHYTOPATHOLOGICAL EFFECTS AND DISEASE TRANSMISSION OF *RALSTONIA SOLANACIARUM* CAUSING BACTERIAL WILT DISEASE OF GROUNDNUT

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ABSTRACT

Groundnut crop suffers from bacterial wilt disease caused by *Ralstonia solenaciarum*. In seedlings of groundnut plant observed primary symptoms such as oozing of basal leaves, apical part of leaves are showing brown colour. The hypocotyl zone was looking in form of rotting in the situation of severe contamination and apical part change into dropping. As compared to moderate infection the severe infections have a large number mortality of contaminated seedlings. Wilting symptoms can be observed on the whole plant in the severe contamination. Occurrence of morphologically wilting symptoms in the early stage indicated to causing agent of *Ralstonia solanacearum*.

KEYWORDS: Mortality, Pot experiments, Disease Transmission, Seedling Symptoms, Inoculation.

INTRODUCTION

Ralstonia solanacearum which is formerly known as *Pseudomonas solanacearum* is spread the bacterial wilt disease (Yabuuchi *et al.*, 1995). Approximately 38-100 percent occurrence of infection of *R. solanacearum* was found in seeds of groundnut which were collected from different part of India. According to Ferreira *et al* (2008) associated bacterial pathogen have been collect the different plant diseased parts such as leaf, flower, stem, fruit, and seeds. Optimum range of temperature for the growth of pathogen on the groundnut at18 - 22°C and optimum humidity range at 30-40 percent were recorded (Chatterjee *et al.*, 1994). In India, the bacterial wilt diseases of groundnut was found from some states such as Gujarat, Rajasthan, Kerala, Karnataka, Sikkim, West Bengal, Himachal Pradesh, Assam, North Eastern State, and the Andaman Islands (Sagar *et al.*, 2014). Khan, R.A.A. *et al* (2020) reported by the research study that the results of different *Trichoderma spp*. which have used against *R. solanacearum* and it were observed by evaluation that the metabolities of *T. harzianum* were more effective than other applied strains.

Aim of the study

The study was aimed to know about the process of transmission of *Ralstonia Solanaciarum* and their phytopathological effects on wilted groundnut.

MATERIALS AND METHODS

Phytopathological study of the wilted plants

In seedlings of groundnut plant observed primary symptoms such as oozing of basal leaves, apical part of leaves are showing brown colour. The hypocotyl zone was looking in form of rotting in the situation of severe contamination and apical part change into dropping. As compared to moderate infection the severe infections have a large number mortality of contaminated seedlings. Wilting symptoms can be observed on the whole plant in the severe contamination. Occurrence of morphologically wilting symptoms in the early stage indicated to causing agent of *R. solanacearum*.

Transmission study of wilt disease

Experiment with culture on petri plate: A total of 79 samples are applying on the culture of petriplate process. Growth have been started after two days of incubation and after 8th day the presence the percentage of seed germination were 94, 78 and 57% in the sample of SM-008 and in the sample of Sm-013 observed the percentage of seed germination were 98, 81 and 61% respectively in the categories of asymptomatic (general), moderate (medium) and deeply discoloured (deeply infected).

Figure- 01: Seed germination on petriplate 8th day of incubation in SM-008.

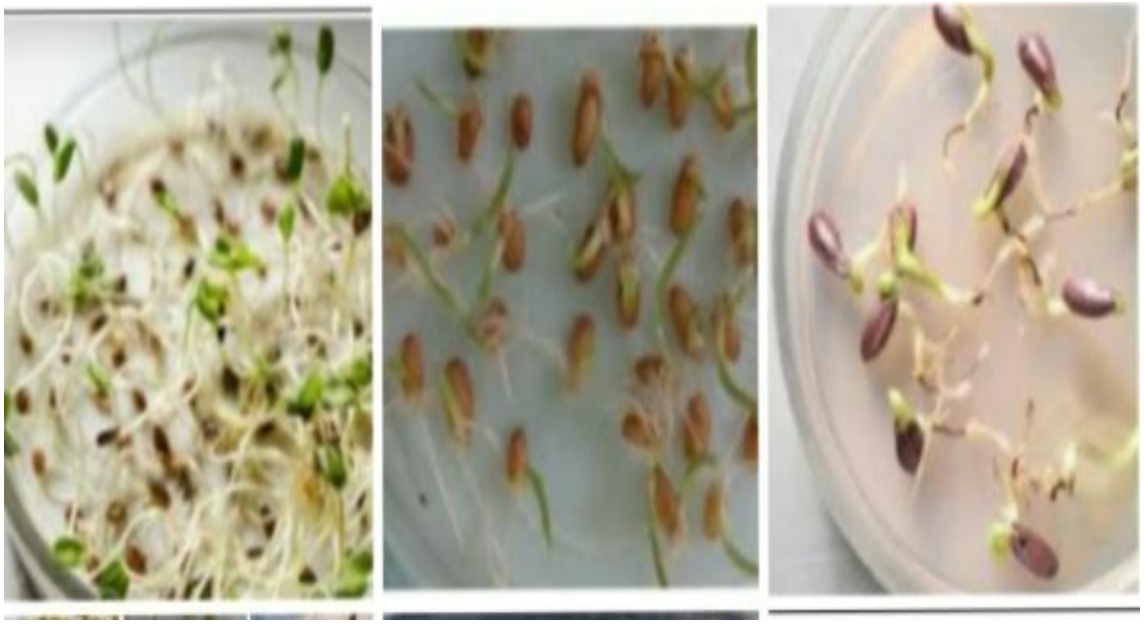

Figure- 02: Seed germination on petriplate after 8th day of incubation in SM-013.

All seeds which are not able to germinate are showing brownish, rotting and oozing of contaminate pathogen. In the sample of SM-008 seedling mortality have been found 3, 3 and 4% and in sample of SM-013 seedling mortality have been observed 1, 4 and 6% respectively in the categories of asymptomatic (general), moderate (medium) and deeply discoloured (deeply infected).

Experiment with test tube seedling symptoms: All those 79 seed samples are applying on method of test tube seedling symptoms. The results are observed after 15th days of incubation and found the percentage of seed germination on water agar test tube were 83, 78 and 62% in the sample of SM-008 and observed in the sample of SM-013 were 82, 76 and 59% respectively in the categories of asymptomatic (general), moderate (medium) and deeply discoloured (deeply infected).

Cotyledonary leaves are observed brownish colour in the early stage. After 15th days the percentage of seedling mortality have been observed were 15, 28 and 33% in the sample of SM-008 and found in sample of SM-013 were 13, 25 and 27% respectively in the categories of asymptomatic (general), moderate (medium) and deeply discoloured (deeply infected).

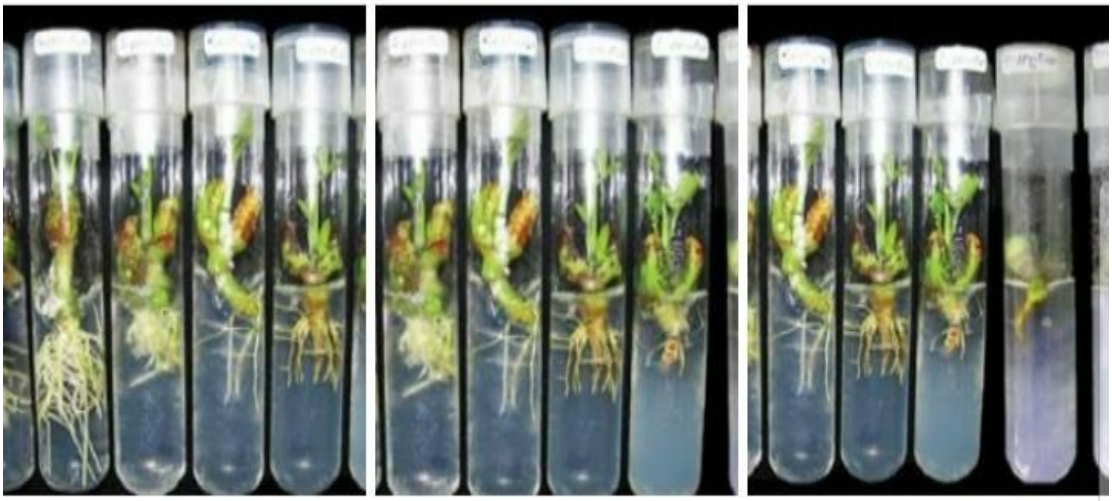

Figure 03: Seed germination on water agar test tube after 15th day in SM-008.

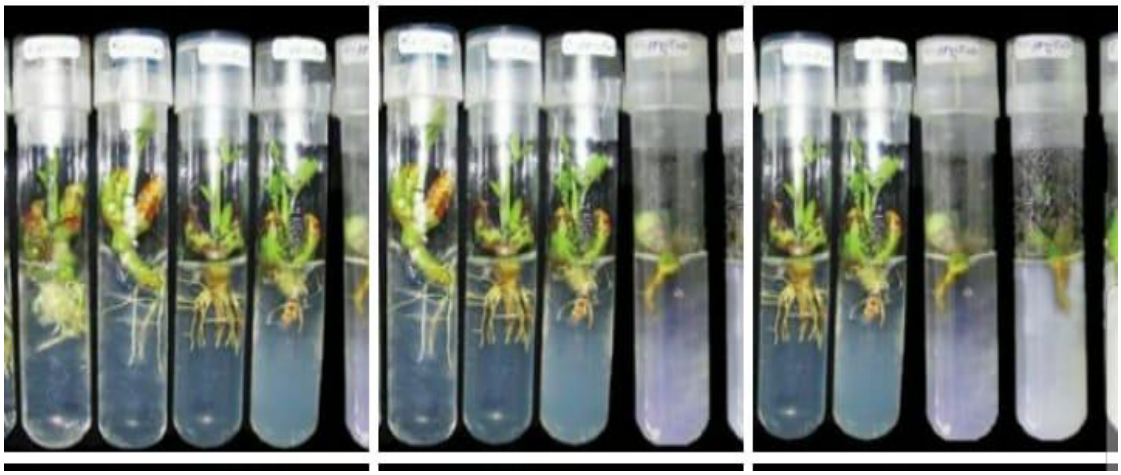

Figure- 04: Seed germination on water agar test tube after 15th day in SM-013.

In deeply discoloured seeds has found highest percentage of mortality in the compare of other two types in the samples of SM-008 and SM-013.

Experiment with pot process: Pot experiments apply with ten days old seedling and continued up to thirty day in symptomatic after growing seed germination. Later than 30 days, Results are showing the percentage of seed germination was observed 80, 66, 58% in the sample of SM-008 and in the sample of SM-013 the percentage of seed germinations are found 79, 68 and 60% in SM-013 respectively in the categories of asymptomatic (general), moderate (medium) and deeply discoloured (deeply infected).

Figure- 05: Seed germination on pot experiment after 30 day in SM-008.

Figure- 06: Seed germination on pot experiment after 30 day in SM-013.

RESULTS

In the sample of SM-008 the percentage of seedling mortality were observed 5, 13 and 21% and in the sample of SM-013 seedling mortality found 6, 14 and 18% respectively. Infected plants features are noted up to stage of fruiting. Symptomatic plant parts were surface Sterilized the infected plant parts and cultured on medium of nutrient agar which later than develop *R. solanacearum* isolates. All these symptoms are observed in fields during the survey.

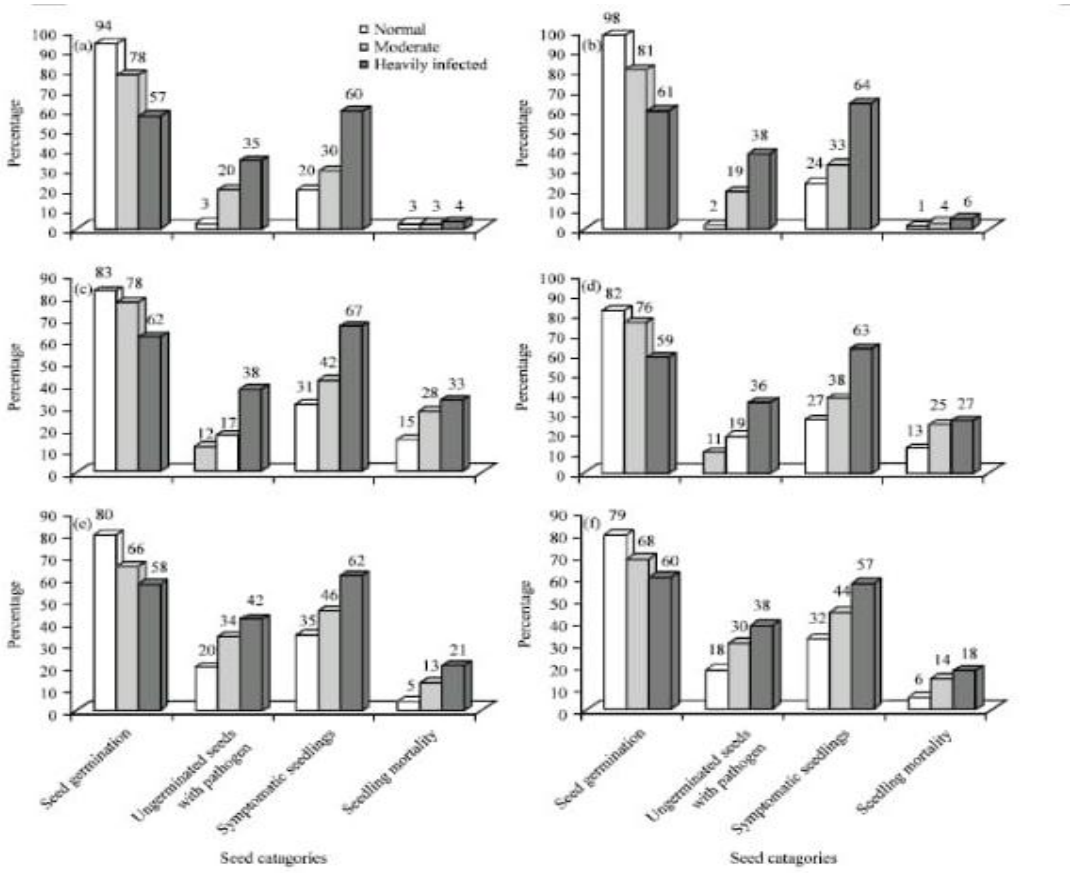

Figure- 07: Showing the result of *R. solanacearum* on the infected seedling of groundnut.

Result of growing seedling in process of petriplate: (a) Tested seedling material- 08 (b) Tested seedling material-13.

Result of growing seedling in process of test tube: (c) Tested seedling material- 08 (d) Tested seedling material-13.

Result of growing seedling in process of pot test: (e) Tested seedling material- 08 (f) Tested seedling material-13

In the early stage infected seedling showing rotting and browning symptoms in the root parts of plants and mortality showed in the last. In the petriplate methods the mortality has been found were 85 and 78.25% in deeply infected seedlings whereas 37.8 and 43.25% mortality found in test tube methods. Approximately within three days after of growth the cotyledonary are leaves showed rotting with brown colour in the situation of stab inoculation. On the fruits of infected plants the brown-sunken lesions are developed by casual agents of *R. solanacearum.*

According to Ramesh R. and Phadke G.S. (2012) newly screened a total of more than hundred strains of endophytic bacteria have antibacterial properties against *Ralstonia solanacearum.* Between (13-100%) incidences of *R. solanacearum* has been observed in the different seed samples which are collected from twelve groundnut producing regions of Rajasthan. Disease transmission of *R. solanacearum* play a major role by seed borne inoculations seed to seedling of groundnut.

DISSCUSSION

It was observed that seed Period In symptomatic seeds the process of germination have more time in the compare of asymptomatic seeds in the groundnut crops. On the hypocotyl regions various primary symptoms are noted like as brownish colour of cotyledonary leaves, showing the stalk reddish colour and found oozing. In the condition of severe infection the whole plant showed wilting symptoms such as rotting stalk, not flowering on plants and necrosis lesion on leaves (Ayers S.H. *et al.*, 1919). Decrease the yield production of groundnut by the harmful effect of bacterial wilt disease is giving an account for a described study. The inoculation percentage is increase with the concentration of suspension of casual agent (Van der Wolf and De Boer, 2007).

CONCLUSION

Approximately within three days after of growth the cotyledonary leaves showed rotting with brown colour in the situation of stab inoculation. On the fruits of infected plants the brown-sunken lesions are developed by casual agents of *R. solanacearum.* Between (13-100%) incidences of *R. solanacearum* has been observed in the different seed samples which are collected from twelve groundnut producing regions of Rajasthan. Disease transmission of *R. solanacearum* play a major role by seed borne inoculations seed to seedling of groundnut. Disease transmission of *R. solanacearum* play a major role by seed borne inoculations seed to seedling of groundnut.

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