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Abstract: Root rot caused by *Rhizoctonia solani* is a major devastating disease of French bean causing significant reduction of yield. Considering the economic importance of the disease present investigation has been come out. The systematic investigation revealed that French bean was found to be infected with root rot at all locations surveyed. Disease incidence varied from 13.4 to 35.8 percent and 14.4 to 32.2 percent during Rabi 2014-15 and 2015-16 cropping season, respectively. Morphological studies revealed that mycelium was monilioid thread and spider and web like on foliage or aerial parts and measured 4.8 μ m to 9.4 μ m in size. Sclerotia were globose to irregular, white to dark brown and measured 1.0 mm to 3.8 mm in size. Mycelium was at first hyaline but brownish at age and septate. Branching often at nearly acute or right angles in older hyphae. Mycelial suspension was found more conducive to disease incidence of root rot with shorter incubation period in comparison to sclerotial suspension. In dual culture maximum inhibition of mycelial growth was noticed in *T. harzianum* (56.36% and 64.91%) after 4 and 7 days incubation which was at par with *T. viride* (54.54% and 63.60%) and followed by *P. fluorescence* (35.83% and 58.36%). In-vitro Neem cake extract inhibited maximum (64.15 and 81.84 %) mycelial growth of *R. solani* at 5 percent concentration after 4 days and (66.48 and 64.97 percent) at 10 percent concentration after 7 days incubation followed by Mustard cake and Karanj cake. Out of eight different plant extracts, Neem (*Azadirachta indica*) leaf extracts inhibited maximum mycelial

growth (66.87% and 54.14%) of the pathogen followed by Bakain (*Melia azadirachta*) leaf extract (50.81% and 24.62%) at 10 percent concentration after 4 and 7 days incubation. At 20 percent concentration, Neem (*Azadirachta indica*) leaf extract recorded maximum inhibition of mycelial growth (98.17% and 74.58%) followed by Bakain (*Melia azadirachta*) leaf extract (77.32% and 67.22%) after 4 and 7 days incubation. In- vitro bioassay of different fungicides viz., Carbendazim, Vitavax, Contaf and Nativo were found to be most effective at all concentrations (viz., 0.025, 0.05 and 0.1%) which inhibited cent per cent growth of *R. solani* after 4 and 7 days incubation. The early sown crop (29th September followed by 19th September and 9th October) was found maximum seed germination percentage and minimum preemergence root rot disease incidence percent and maximum green pod yield. Seed germination and green pod yield showed highly significant positive association with maximum and minimum temperature, but pre-and post-emergence showed highly significant negatively association with maximum and minimum temperature during both the years Rabi 2014-15 and 2015-16 cropping season. Seed treatment with *Trichoderma viride* @ 5.0 g/kg seed showed maximum seed germination (85.82%) and minimum pre- emergence (13.93%) and post- emergence (17.00%) root rot incidence and maximum yield (63.44 kg/ha). Correlation coefficient studies exhibited negative and highly significant association of pre- and post-emergence root rot disease incidence with green pod yield during both the years Rabi 2014-15 and 2015-16 cropping seasons. Among oil cakes tested, Neem Cake revealed maximum seed germination (88.06%), minimum pre- and post- emergence mortality (11.26% and 13.07%), and maximum green pod yield (64.44 q/ha). Multiple correlation coefficient showed positive and highly significant association of plant height, number of branches/plant, number of green pods/plant, pod length/pod and green pod weight/plant with green pod yield in both the years 2014-15 and 2015-16. Among the different soil drenching of plant extracts, maximum seed germination (89.53%) and green pod yield (68.0 q/ha), minimum mean post-emergence (13.70%) root rot incidence was found by soil drenching of Neem leaf extract, But minimum preemergence was found by soil drenching of Bakain leaf extract. Correlation coefficient showed positive and highly significant association of plant height, number of branches/plant, number of green pods/plant, pod length and green pod weight/plant with green pod yield during 2014-15 and 2015-16. Among seed treatment with fungicides, maximum seed germination (89.89%), maximum green pod yield (72.16 q/ha), minimum mean pre- (10.11%) and post (11.92%) - emergence root rot incidence was observed by seed treatment with Carbendazim. Multiple correlation coefficient showed positive and highly significant association of plant height, number of branches/plant, number of green pods/plant, pod length and green pod weight/plant with green pod yield. Combination of soil application of mustard cake @ 10.0 q/ha plus soil application of FYM enriched with *T. viride* plus soil drenching with Carbendazim (0.1 %) recorded minimum pre-emergence (8.13 percent) and post-emergence (11.6 percent) root rot disease coupled with maximum yield (83.75 q/ha). Multiple correlation coefficient showed positively and highly significant association of plant height, number of branches/plant, number of green pods/plant, pod length and green pod weight/plant with green pod yield during 2014-15 and 2015-16 cropping seasons. Out of fourteen varieties/cultivars screened, the two cultivars, HAFB-2 and YCDI showed resistant reaction against the disease.

Description: STUDIES ON ROOT ROT (*Rhizoctonia solani* Kuhn) OF FRENCH BEAN

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