ABSTRACT
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(1) Collection of infected samples of rice plants was made from major rice growing areas of old Sibsagar district, viz., Nazira, Teok, Dergaon, Karangaon, Joysagar, Jhanji, Titabar in the year 1985. The varieties of rice included were Joha, Monohar sali, IR8, Pusa, Aijung, Bora and Benibhog.

(2) 66 isolates of fungi were obtained from different infected parts, viz., leaves, nodes, panicles and grains of rice plants and the fungus Pyricularia oryzae Cav. was found to be responsible for this disease of rice plants which was found widely prevalent in all these seven localities. Strain differentiation was made basing on morphological and physiological characters and also on degree of virulence. 4 different strains of Pyricularia oryzae Cav., viz., "As", "Bs", "Cs" and "Ds" were obtained but only 3 strains (Bs, Cs and Ds) showed sufficient virulence. The strain "Ds" was found to be the most virulent among them, whereas the strain, "As" was found to be the least virulent.

(3) Test of resistance was carried out with 7 varieties of rice of which "Pankaj" was found to be the most resistant. The variety "Saket" was found to be the most susceptible against Pyricularia oryzae Cav.
(4) Study on fungal physiology of the virulent strains showed variation in growth characters in different nutrients and host extract media. Among the solid media the host extract agar medium provides as the best medium for growth and sporulation. Among the synthetic media, Czapek dox liquid medium was found to be the most favourable for growth and sporulation. Among the synthetic and non-synthetic media, the best was found to be the non-synthetic medium (Rice powder agar medium). On the other hand, among the synthetic medium, "medium E" (glucose, KH$_2$PO$_4$, MgSO$_4$, Asparagine, thiamine hydrochloride, Biotin and double distilled H$_2$O) showed the maximum vegetative growth and sporulation.

(5) Evidences also showed that external stimuli, viz., temperature, pH, relative humidity had much influence on growth and sporulation of these strains of *Pyricularia oryzae* Cav.

(6) Carbon and nitrogen sources also found to influence the growth and sporulation of these 3 strains of *Pyricularia oryzae* Cav. to a certain extent. Among the carbon sources, cellulose showed the best growth of the strains; while manitol gave the minimum growth of all the 3 strains.

   Among the nitrogen sources, Czapek's medium containing Biotin as N$_2$ source, showed the best growth and sporulation while Czapek's medium containing ammonium
sulphate as nitrogen source showed poor sporulation.

(7) Germination of the conidia of *Pyricularia oryzae* Cav. started from 2 hours onwards and it gradually increases up to 10 hours.

(8) The extent of infection on leaf, stem and neck was also found to occur to a certain extent. In case of leaf and stem, it was noticed that the extent of infection was higher and faster in young leaf blades and stems than in the mature ones.

The rate of germination of conidia over the neck region was found to be faster than the leaf blades.

(9) Losses in grain yield from panicle and leaf blasts were also determined in different varieties (very susceptible, susceptible, moderately resistant and resistant). In both the panicle and leaf blast, susceptible variety showed greater loss than the resistant variety. Aijung variety showed the heaviest yield loss in both panicle and leaf blast and the variety, Pankaj, showed the least yield loss in both panicle and leaf blast.

(10) Presence of various types of fungi (at different depths) from the soil of rice plantation area of old Sibsagar district were recorded. *Pyricularia oryzae* Cav. was found to be present at all different depths except 12 inch. The other types isolated were - Mucor, Pythium, Rhizopus,
Phytophthora, Aspergillus, Penicillium, Alternaria, Cladosporium, Colletotrichum, Helminthosporium, Curvularia and Fusarium sp.

(11) Types of fungi isolated from the paddy field soil, generally more or less parallel to those occurring in the atmosphere. Of the types, that had been isolated, a few were specifically parasitic. These soil and air spora are also isolated from the infected rice plants which showed a correlation of incidence of infection of the rice plants by the pathogenic organisms present either in soil or in air.

(12) Pectic enzymes were produced by *Pyricularia oryzae* Cav. in vivo and in vitro. The enzyme preparation from the *Pyricularia oryzae* Cav. infected tissue caused maceration of certain tissue system by attacking the middle lamella of the tissues. Partial loosening of the tissue of Pear was made in 180 minutes whereas this was not so effective in case of rice plant tissues.

(13) The percentage of sugar, nitrogen, chlorophyll and silica was determined in both healthy and infected rice tissues. During the process of infection, reduction of sugar and nitrogen and chlorophyll content was significant. In healthy plants the content of silica was found to be increased according to the increase of age. But
in case of diseased plants, although the content of silica was found to be increased during infection at the very beginning, yet it gradually decreased according to the increase of age period.

(14) The pathogen, *Pyricularia oryzae* Cav. was found to secrete non-host specific toxin. From the toxin metabolite of 3 different age periods, crude toxin were separated and paper chromatography was done which showed that the pathogen secreted only one toxin. The toxin produced wilting and it was thermostable. For determination of specific toxin that had been detected here, further investigation is needed.

(15) Histological studies showed that the blockage of xylem vessels caused by some brown gummy substances which was secreted due to the effects of toxin on host tissues. Toxins also had effected on the stomatal guard cells and on denaturation of hydrophytic plant tissues. From the chemical extraction and chromatographic study it was seen that the toxin was specific.

(16) Presence of saprophytic and parasitic fungi were recorded in the seeds stored for different ages and it was found that the presence of both parasitic and saprophytic fungi increased along with the increase of years in storage. At the same time the germination of the seeds decreased with the age.
The degree of pathogenicity of 3 strains of *Pyricularia oryzae* Cav. to Chichory and Citranella two newly introduced crop plants in N.E. region other than rice had also been studied and their different degrees of pathogenicity was determined against *Pyricularia oryzae* Cav.

The blast disease of rice caused by *Pyricularia oryzae* Cav. was controlled with the treatment of chemicals (antibiotics and fungicides). Data obtained for germination percentage of rice seeds, and survival of seedlings, infection and total yield in response to chemical treatment showed that antibiotics, viz., Actidione and fungicides, viz., Tricyclazole were more effective in control of the disease.