

VI. PLANT PATHOLOGY

1. STUDIES ON THE INFLUENCE OF FERTILISERS ON THE SILICA CONTENTS OF BLAST RESISTANT AND SUSCEPTIBLE PADDY VARIETIES

by

C. P. NATARAJAN, K. T. NARASIMHAN, C. GOPAL, K. SIVASANKARAN NAIR
and V. SRINIVASAN

Experiments were carried out to find out the effects of application of 6 different nitrogenous fertilizers and 9 different combinations of nitrogen and potash on the silica content of one blast resistant (Co. 4) and one susceptible (ADT 10) paddy varieties. One pot culture trial for studying the effect of sodium silicate at 3 levels — 0, 1000 and 2000 lb/acre — was also carried out with the same two paddy varieties. The results obtained for the three years 1958—'59 to 1960—'61 are presented in this paper. The important conclusions obtained are as follows:

1. There was no significant difference between the blast resistant and susceptible paddy varieties Co. 4 and ADT 10 in their silica contents in the shoots.
2. Among the 6 nitrogenous fertilisers tried, urea produced significantly higher silica in both the varieties than the other 5 fertilisers during the tillering stage; but at boot stage the results were not conclusive. Increasing doses of nitrogen and potash individually favoured a general increase in the silica contents of the plants but in their combined effect they seemed to be somewhat mutually exclusive; the increasing level of one depressed the effect of the other. Increasing doses of nitrogen and potash influenced a higher silica content in the susceptible than in the resistant variety. Application of sodium silicate in increasing levels also produced significant increases in the silica content of both the paddy varieties. There was a marked increase in the silica content in the plants from the tillering to boot stage, irrespective of the fertiliser treatments.

* There was a lengthy discussion on this paper. The questions raised during the discussion were:

1. Whether there was any information on the physiological role of silicon in rice plants.
2. Whether application of high levels of sodium silicate had any phytotoxic effect on rice plants.
3. Whether application of sodium silicate at higher doses conferred any protection from blast in the susceptible variety.
4. Whether any relationship existed between the silica content of the plant as a whole and the number of silicated epidermal cells in the paddy leaf.
5. Whether natural blast incidence was noticed during the three years of the experiment and whether artificial infection of the experimental varieties was resorted to under the different treatments of the experiment, and
6. Whether *Piricularia oryzae* Cav. produced any extracellular enzymes capable of dissolving silicated cell walls.

The following replies were furnished by the author for the above questions:

1. Silicon had an indirect effect on phosphorous assimilation.
2. Sodium silicate did not have any phytotoxic effect on rice plants at the levels tried; on the other hand it seemed to stimulate crop growth.

3. The question of increased protection to blast susceptible variety could not be ascertained as no artificial infection was resorted to. 4. A direct correlation between the silica content of the plant and the number of silicated epidermal cells has been observed. 5. A certain amount of blast incidence was prevalent during the course of the experiments in the field; but neither the percentage nor its intensity was high. No artificial inoculation was done. 6. No information is available on production of silica destroying enzymes by *P. oryzae*.

In addition to the above questions, several suggestions were offered on future lines of investigations. Earlier findings by Japanese and Indian workers had indicated some amount of direct correlation between silica content of leaves and resistance to blast disease. But in the present experiments these observations have not been corroborated. It was, therefore, suggested that the exact role of silica in the paddy plant with particular reference to blast disease resistance should be investigated by more precise experiments. There is a growing feeling among research workers on paddy blast that the role of silica in conferring resistance to the disease is not purely a mechanical one but a physiological explanation of its role had to be found.

It was pointed out that much of the conflicting results obtained in the present experiments may have been due to the fact that the experiments were conducted in field grown crops where no control of the soil environment was possible. Precise experiments in liquid culture should be conducted to elucidate the role of silica in the pathological physiology of the paddy plant. It was also suggested that the comparison of the silica content of the varieties should have been based on the silica contents of their leaves and not the entire plant. It was also emphasised that the dynamics of amino acid metabolism was very important.

2. STUDIES ON RESISTANCE TO *Piricularia oryzae* Cav. IN RICE IN MADRAS—DISEASE INCIDENCE IN RELATION TO TIME OF PLANTING

by

J. CHANDRA MOHAN and S. PALANISWAMY

In order to assess the incidence of blast disease (*Piricularia oryzae* Cav.) in relation to the time of planting, trials were conducted for nine years from 1953-'54, at Coimbatore. Varieties were planted every month commencing from the first week of September till the 1st week of January. The infection was recorded for node and neck symptoms in respect of each variety. It was found that in the case of short duration group, the intensity of the disease was greatest when planted in October and November. In the medium duration group, September and October planted crops were severely affected and the incidence was comparatively less in subsequent plantings. In long duration varieties infection was noticed in September, October and November plantings. The flowering phase of the crop has been found to synchronise with the cold months of the year viz., late November, December and January when low night temperature, high humidity and copious dew formations prevail.