

Pot culture studies on salt tolerance of certain paddy varieties

One of the major problems of paddy cultivation in areas like Kuttanad in this state is the salinity of the soil and the water used for irrigation. At sowing time (October-November) the soils are practically free of any salt the conductivity values being in most cases below 1 millimhos/cm, while at harvest time (January-February) the values go up to about 6 millimhos/cm. The resistance of any plant to salinity is lowest at germination time, and increases gradually as it matures. But there is at present very little data regarding the maximum tolerance level of different varieties of paddy at different stages of their growths. A conductivity value of 3.0 millimhos/cm. and above is supposed to be injurious to most crops. So it appeared interesting to find out the causes behind the fact that some varieties cultivated in this area could thrive and yield in a soil with double this salt content.

The present preliminary study was conducted to elucidate the following points:

1. The relationship between maturity and salt tolerance.
2. The salt tolerance of certain local and improved varieties.
3. whether varieties acclimatised to saline areas differ in their salt tolerance from others.
4. Whether a variety can be made more salt tolerant by allowing it to grow in a saline medium.

EXPERIMENT

Six varieties of rice were chosen for the experiment—two selections ($M0_2$ and CH_{10})

introduced into the area comparatively recently, two of the local varieties of Kuttanad (*Thirinjavella* and *Kochathikralli*) which have been used there for a long time and two varieties from non-saline areas (*Velutha chuttiathi* and *Kattadi*).

Clay loam from the Vellayani fresh water lake was used for the experiment. In order to avoid addition of fertilisers into the pots during the course of the experiment, quantities sufficient to meet the entire needs of the plants were added to the soil before transferring to the pots. After this addition the soil was kept at optimum moisture level for one month to condition the soil. It was then dried and weighed into 144 small pots at the rate of 1 lb./pot. Conductivity of this soil was determined for soil-water ratio 1.2 and was found to be 15 millimhos/cm.

The pots were arranged in six rows with 24 in each row and sprouted paddy sown in the pots—one row for each variety.

The vegetative growth of *Thirinjavella* and *Kochathikralli* was very good as compared to that of the other four varieties.

It was decided to grow each variety in both saline and nonsaline media and to measure their salt tolerance under both conditions at 15 day intervals for a period of three months. For this purpose sodium chloride solution to the maximum tolerance level of the plants at that particular stage was added at 15 day intervals to half the number of pots in each row.

The table given below indicates the maximum salt concentration in the soil (expressed as conductivity, millimhos/cm) which these

TABLE

Age of plants	MO ₂		CH ₁₀		<i>Thirinjavella</i>		<i>Kochathikrali</i>		<i>Veluthachuttiathi</i>		<i>Kattadi</i>	
	A	B	A	B	A	E	A	B	A	B	A	B
15 days		2.7		2.7		4.5		4.5		2.4		2.3
30 days	3.3	3.1	3.3	3.1	5.75	5.25	5.5	5.25	3.0	2.8	3.1	2.9
45 days	4.3	4.0	4.25	4.0	6.75	6.0	6.5	6.0	4.0	3.5	4.0	3.5
60 days	4.0	4.5	5.0	4.5	7.5	7.0	7.25	6.75	4.75	4.25	4.75	4.5
75 days	5.5	5.0	5.5	5.0	7.75	7.5	7.5	7.25	5.0	4.75	5.0	4.75
90 days	5.5	5.0	5.5	5.0	8.0	7.5	8.0	7.5	5.25	4.75	5.25	5.0

A — Saline medium

B — Non-saline medium.

varieties were able to tolerate at different stages of their growth.

The results indicate the following :

- (1) The salt resistance capacity of all varieties increases with maturity.
- (2) Varieties which have been continuously grown in the locality for long periods (*Thirinjavella* and *Kochathikrali*) exhibit a much higher salt tolerance than either improved varieties

recently introduced or varieties from non-saline areas.

- (3) The salt tolerance of any variety can be increased to some extent by growing it in a saline medium.

From the above results we can conclude that locally popular varieties are much more tolerant to salinity than some of the improved varieties introduced. It opens up possibilities of evolving a very highly salt resistant variety by subjecting the plants artificially to high degrees of salinity.

Soil Testing Laboratory, ,
Agricultural College,
Vellayani, 25-3-1961. J

P. K. ZACHARIAH.
H. S. SANKARASUBRAMONEY.