PADDY NOTES (IV)

(A) AN IRRIGATION POT EXPERIMENT
(B) THE VIABILITY OF LONG-AGED PADDIES

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(A) AN IRRIGATION POT EXPERIMENT

IT has been found in California that continual submergence of rice fields from an early stage in the growth of the plants has a very definite effect in preventing weed growth. This was confirmed at Peradeniya. It appears that if the fields are submerged before the weeds (mainly *Cyperaceae* with *Fimbristylis miliacea* are probably the most important) are tall enough to reach the water level growth is prevented and the plants eventually die. It has been noticed also that the weed growth in fields unavoidably kept dry in the early stages has been profuse. Where it can be practised, therefore, continual submergence of rice fields offers a method of reducing weeding costs or alternatively of securing a better yield without weeding. Continual submergence, however, can only be carried out where water is plentiful and bunds are sufficiently high and impervious. Moreover, it has been stated that the drying of fields, which perforce takes place in many districts in Ceylon during the growth of the crop sometimes to such an extent that cracks appear in the soil, encourages root development and is therefore beneficial. With the object of obtaining information on this point pot experiments were laid down at Peradeniya in the *yala* season of 1929 and the *maha* season of 1929-30.

The experiments were carried out in cement pots whose inside measurements were 12 in. square and 14 in. deep. Regulated drainage was provided at the bottom of the pots. Precise irrigation experiments under field conditions necessitate the construction of special and expensive bunded fields and drainage channels. As these could not be prepared pots had to be used although it was realised that pots do not exactly simulate field conditions. There can be no doubt, however, that the drying of the pots can be adequately performed, and excessive drying was prevented by confining the dry periods to seven days.

The pots were situated in a plant cage to prevent damage by birds. The depth of soil in the pots was 10 in., and the normal depth of submergence (when the seedlings were tall enough) was 3-4 in. In both seasons four groups (hills) of three seedlings each were transplanted from field nurseries into each pot and the normal drainage and slight irrigation of the pots were followed until ten days after transplanting when the pots were submerged; i.e., from 3-4 in. of water were maintained in the pots; this, of course, did not cover the young seedlings. The pots dried periodically were kept submerged for fourteen days and dry for seven. A small opening was permanently kept in the bottom of all pots to simulate natural drainage. All pots were drained about a fortnight before harvesting.

For the *yala* experiment eighteen pots were used, nine of which were continually submerged. The two lots of pots were placed in two adjoining lines but there was no randomization of the pots. The mean yield of the periodically dried pots was 54·26 and of the submerged pots 59·36. The standard error of the mean difference was 2·85 (5·02%). The difference in yield is not statistically significant. A more precise experiment followed for *maha* in which twenty-four pots were used, in randomized groups of three giving eight replications. To the previous two treatments of periodic drying and continual submergence throughout the growth of the crop there was added a third treatment, that of periodic drying for the first three months followed by continual submergence thereafter. The results of the experiment will be found in table I and the analyses of variance in tables II and III.

TABLE I

Synopsis of the Irrigation Pot Experiment, Maha 1929-30

Treatment	Total yield of 8 pots in gm.		Mean yield per pot in gm.		Yield expressed as percentages of treatment B.	
	grain	straw	grain	straw	grain	straw
A. Periodic drying ...	504·5	631·0	63·06	78·87	76·27	74·24
B. Continual submergence ...	661·5	850·0	82·69	106·25	100·00	100·00
C. Combination of A. & B. ..	533·5	690·5	66·69	86·31	80·65	81·24

TABLE II

Analysis of variance, grain weights.

Variance due to	Deg. of F.	Sum of squares	Mean squares	S. D.	Log E.	SEmd.
Blocks ...	7	772·822				
Treatments ...	2	1748·999	874·4995	29·57	3·3868	
Exptl. Error ...	14	1292·834	92·3453	9·61	2·2628	4·93 (6·96%)
Total ...	23	3814·655		$Z =$	1·1240	5% point Z = ·6594

TABLE III

Analysis of variance, straw weights.

Variance due to	Deg. of F.	Sum of squares	Mean squares	S. D.	Log E.	SEmd.
Blocks ...	7	1404·096				
Treatments ...	2	3204·086	1602·043	40·03	8·6896	
Exptl. Error ...	14	1154·748	82·482	9·08	2·2061	4·54 (5·02%)
Total ...	23	5762·930		$Z =$	1·4835	5% point Z = ·6594

It will be seen that the continually submerged pots have beaten both the other treatments and the experiment with both grain and straw yields successfully passes the Z test. The close agreement between grain and straw differences is striking.

It may be definitely concluded that under normal conditions of drainage periodic drying has no advantage which is reflected in grain or straw yields and that on the other hand there is evidence to show continual submergence is beneficial.

(B) THE VIABILITY OF LONG-AGED PADDIES

One of the writers has already published* certain data about the germination of rice seeds in Ceylon, chiefly concerning the length of the resting period which ensues after harvesting before maximum germination is attained. The following account of the effect of age on viability is the natural continuation of the study there begun and shows the rapid fall in the germination percentage which takes place after seed has been left in storage for a year.

* Lord, L. The germination of rice seeds in Ceylon.—*Annals Roy. Bot. Gardens, Peradeniya*, XI, 2-123, 1929.

In this investigation the seed, nine different pedigree selections, was tested for viability at 7, 10, 13, 16, and 19 months after harvest. The seed was stored in a fumigated seed store at Peradeniya and the selections included both large and small grained rices. The age of the selections (that is the time from sowing to ripening) varied from 6-6½ months. In each test 400 seeds of each selection were taken and the test was carried out according to the technique described in the publication mentioned above.

The results of the tests will be seen graphically in Fig. I. From ten months after harvest the viability of the seed lessens and there is a heavy fall between the thirteenth and sixteenth month. By the nineteenth month none of the selections was viable. Normally the seed of long-aged paddies is sown 5½ to 6 months after harvest. Should unfavourable conditions prevent the crop being sown the seed will be useless for sowing the following year, that is eighteen months after harvest. Fortunately the complete loss of a crop in the regions when such long-aged paddies are grown is rare but where short-aged paddies (3-4 months) are grown crops are sometimes a complete failure or in bad seasons cultivation may not take place. In these cases the question of seed becomes urgent and is generally obtained from places where a crop was grown the previous year. The effect of age on the viability of short-aged paddies is under investigation.