

TRIALS WITH MUD PADDY UNDER UNIRRIGATED CONDITIONS

C. N. E. J. de MEL, B.Sc. (Hons.), B.Sc., Agric. (Lond.), Dip.
Agric. (Wye),
PRINCIPAL, FARM SCHOOL, PERADENIYA

IT is unusual in this Island to grow mud paddies except under irrigation. Rice cultivation on dry lands is entirely restricted to varieties of hill paddy (*elwi*). The first attempt to grow a mud paddy on dry land at Peradeniya was made on this station during the *maha* season 1935-36. The degree of success which attended this attempt led to continued trials each season. In this article are discussed the conditions which appear necessary for successful cultivation of a mud paddy on dry land in the absence of irrigation facilities.

Trials have so far been restricted to two pedigree selections which were originally obtained from the Eastern Province. The paddies selected for trial were *Vellai Illankalayan*, pedigree selection No. 28061, for the *maha* season, and *Pachchaiperumal*, pedigree selection No. 2462, 11, for the *yala* season. *Vellai Illankalayan* is a four-months' paddy in the Eastern Province, where it is known to yield up to 60 bushels per acre under good cultivation. *Pachchaiperumal* is a three-months' paddy yielding up to 50 bushels per acre, although 40 bushels per acre may be considered a good average yield.

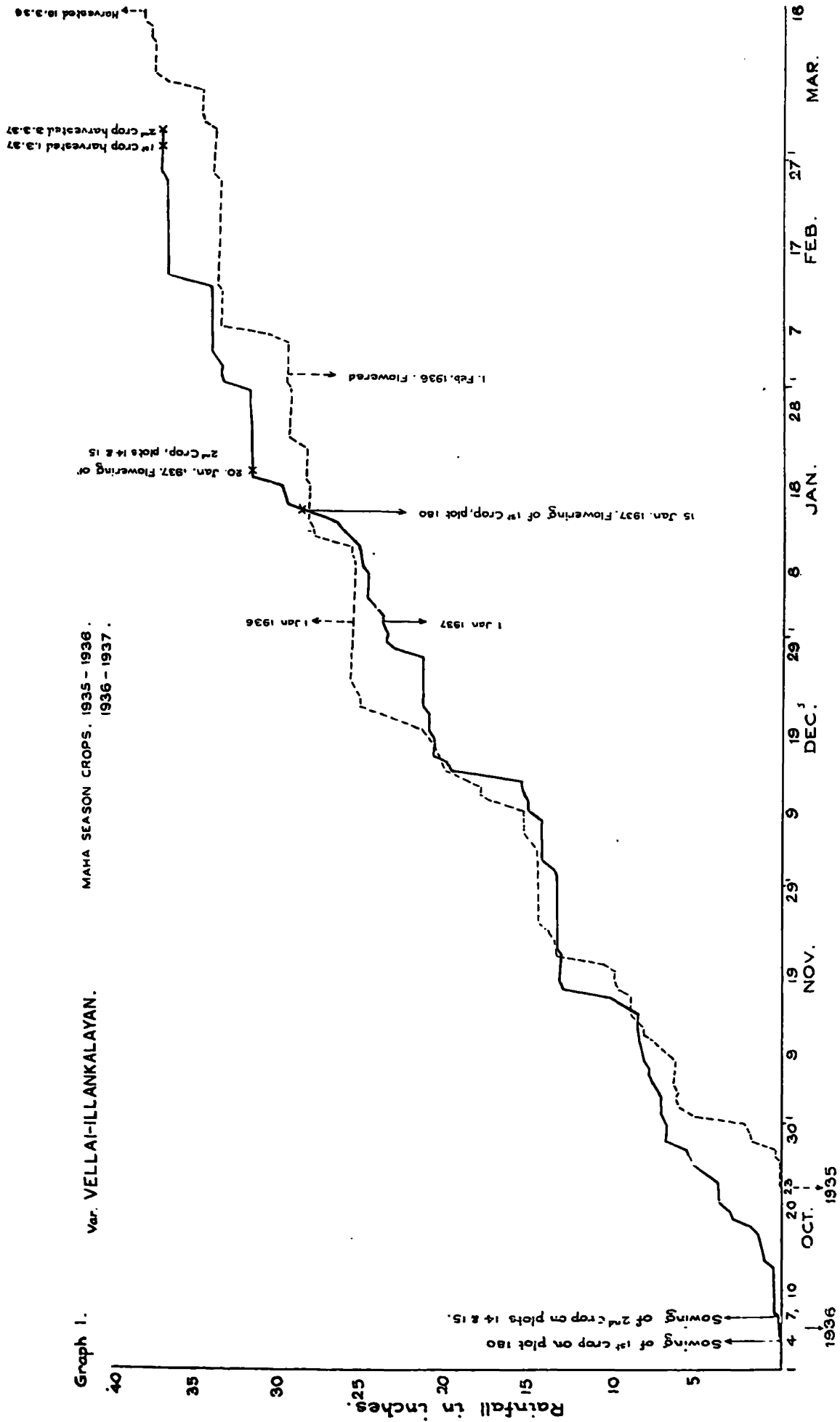
VELLAI ILLANKALAYAN

The first trial with this pedigree selection was made during the *maha* season 1935-36 on plot 180. The soil was sandy, and was under cowpeas during the preceding four months. After harvesting the pods, the cowpea plants were ploughed in early in October, 1935. On the 23rd October, after an application of 2 cwt. of Nicifos No. 2, four bushels of paddy were broadcast on an extent of 1.8 acres. Fifty per cent. of

Graph 1.

Var. VELLAI-ILLANKALAYAN.

MAHA SEASON CROPS. 1935 - 1936.
1936 - 1937.



the plants were in flower on 1st February, 1936. The crop was harvested on 18th March, 1936, and yielded 24·9 bushels per acre. It was observed that the period of maturity was longer than the period in the Eastern Province by nearly four weeks.

During the *maha* season, 1936-37, the same pedigree selection was grown on plot 180, but on $3\frac{3}{4}$ acres where the soil varied from a sandy loam to a light sandy soil. During the *yala* months, April to August, 1936, this area was under a mixed green manure crop of *Crotalaria anagyroides* and *Tephrosia candida* which were slashed and ploughed in. On this occasion the paddy seed was drilled in by the Indian seed drill in rows one foot apart after an application of Nicifos No. 2 at the rate of $\frac{3}{4}$ cwt. per acre. The plants flowered in middle January, 1937, and the crop was harvested on the 1st March, 1937. The yield was 138·75 bushels or 36·9 bushels per acre.

During the same season the same variety of paddy was drilled on plots 14 and 15, two acres in extent. This area had been limed in March, 1936, as a corrective for soil acidity, and was subsequently under a crop of sunnhemp (*Crotalaria juncea*). This crop was slashed early in September, 1936, and ploughed in after a further application of 1 ton of lime per acre. On 1st October, 1936, the plots were disc-harrowed after applying ten tons of compost manure per acre. On the 7th October, 1936, Nicifos No. 2 was broadcast at 1 cwt. per acre and seed was drilled in at 1·5 bushels per acre in rows one foot apart. The plants were in flower on the 20th January, 1937, and were harvested on the 3rd March, 1937, giving the very satisfactory yield of 48·75 bushels per acre.

Table I shows the distribution of the rainfall during the periods of growth of the three crops mentioned above. Graph I shows the cumulative amounts as well as the daily amount of rainfall which these crops received on any given date during their period of growth. The two crops drilled respectively on plot 180 on the 4th October, 1936, and on the two contiguous plots 14 and 15 on the 7th October, 1936, received identically the same amount of rain. One curve is therefore used for both these crops, and the respective dates of flowering and harvesting are marked on the curve. The second curve represents the rainfall during the *maha* season, 1935-36.

TABLE I

MAHA SEASON

Rainfall

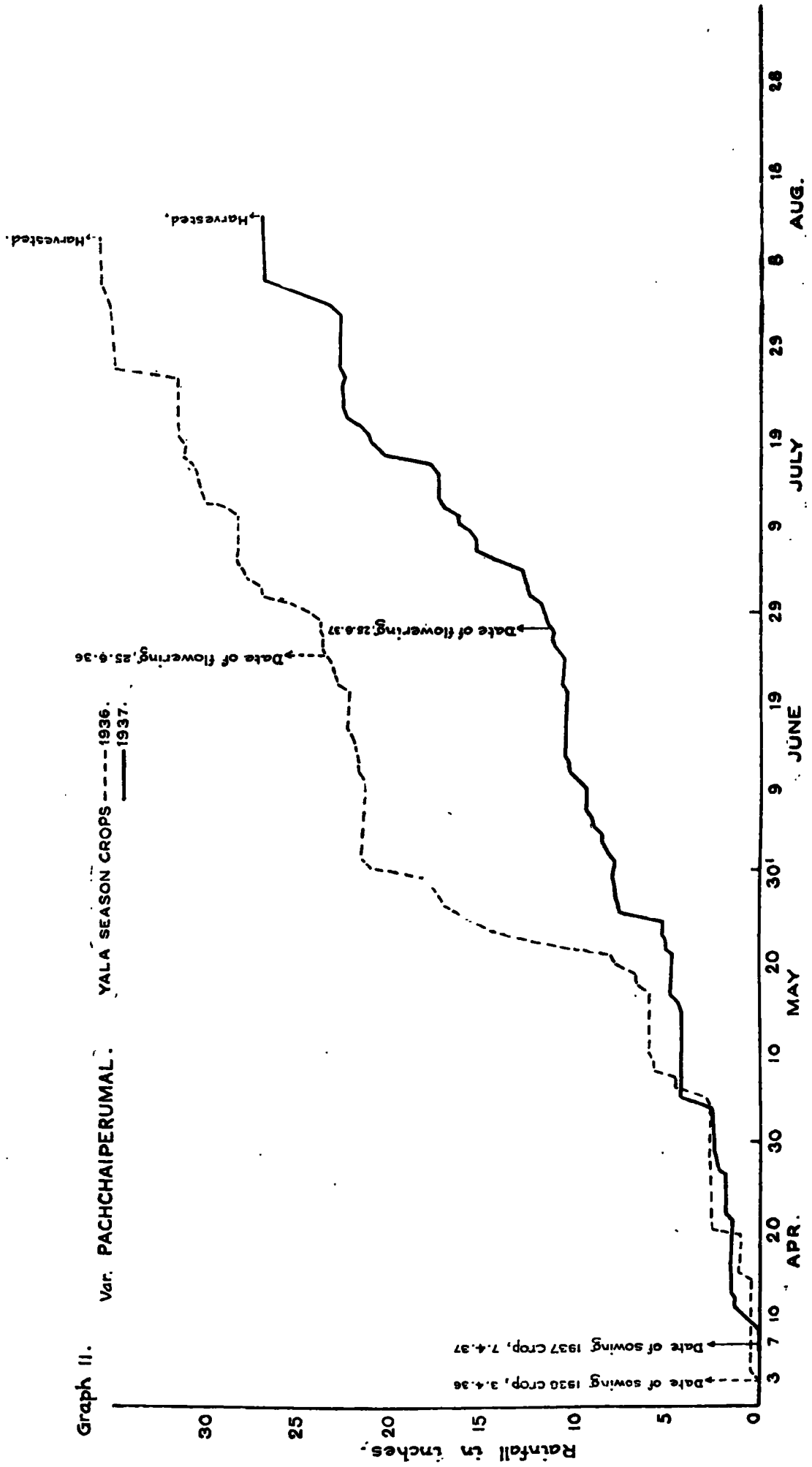
Plot No.	Date of Sowing	October Inch Days	November Inch Days	December Inch Days	January Inch Days	February Inch Days	March Inch Days	Date of Flower- ing	Date of Harvest- ing	Period of Maturity Mth. Days	Area sown, acres	Total yield. bus- hels	Yield per ac- re, bushels
180	Broadcast 23-10-35	2.07 5	12.57 19	10.42 18	4.75 11	4.55 5	4.17 7	1-2-36	8-3-36	4 26	1.8	44.75	24.9
180	Drilled 4-10-36	6.76 17	6.83 17	10.29 14	7.79 13	3.67 5	— —	15-1-37	1-3-37	4 28	3.75	138.75	36.9
14 & 15	Drilled 7-10-36	6.75 16	6.83 17	10.29 14	7.79 13	3.67 5	— —	20-1-37	3-3-37	4 26	2	97.5	48.75

Graph II.

Var. PACHCHAIPERUMAL. YALA SEASON CROPS

----- 1936.

————— 1937.



PACHCHAIPERUMAL

The first crop of *Pachchaiperumal* was obtained in *yala*, 1936, on plot 20, and yielded 25·25 bushels per acre. The plot was limed to correct acidity and 4 tons of compost were applied during cultivation. Paddy seed was drilled in rows one foot apart after the application of 2 cwt. of Nicifos No. 2 and $\frac{1}{2}$ cwt. of sulphate of potash. The seed rate was 1·5 bushels per acre. The plants were fifty per cent. in flower on the 26th June, 1936, and the crop was harvested on the 12th August, 1936. The crop sustained some damage from the paddy bug (*Leptocorisa varicornis*) which appeared in large numbers, and also from frequent heavy showers during the period of flowering. On threshing a high percentage of empty seed was found.

This variety of paddy was repeated on plot 180, a sandy loam, during the *yala* season, 1937. The extent was 3·75 acres, and the land had been previously under turmeric, ginger and sweet potatoes. The land received an application of 5 tons of compost per acre and later $\frac{1}{2}$ cwt. of Nicifos No. 2 and $\frac{1}{4}$ cwt. of steamed bone meal per acre. This plot proved very weedy, especially due to the presence of the troublesome weed kora (*Cyperus rotundus*). The plants came into flower about the 28th June, 1937. Large numbers of paddy bugs were caught and destroyed. The crop was harvested on the 30th August, 1937, and yielded 39·25 bushels, or 10·5 bushels per acre. The causes for this low yield, apart from the damage by paddy bug, are commented on below.

Table II shows the distribution of the rainfall during the growth of these two crops, while graph II shows the cumulative and also the daily rainfall during the same periods.

TABLE II

YALA SEASON		Rainfall										Yield per acre bushels
Plot No.	Date of Sowing	April Inch Days	May Inch Days	June Inch Days	July Inch Days	August Inch Days	Date of Flowering	Date of Harvesting	Period of Maturity Mth. Days	Area sown in acres	Total yield in bushels	
20	Drilled 3-4-36	2.60 7	18.69 23	4.23 16	10.02 23	0.68 7	25-6-36	12-8-36	4 10	1	25.25	25.25
180	Drilled 7-4-37	3.98 15	5.49 14	3.93 22	10.91 25	4.16 6	28-6-37	13-8-36	4 7	3.75	39.25	10.5

DISCUSSION

An examination of tables I and II along with the corresponding rainfall curves shows that the factor which decides the success of a crop of mud paddy under unirrigated conditions is the rainfall. The amount of rain received by the crop and its distribution are equally important. The flat portions of the curves represent periods of no rain. In the *maha* season crops 1936-37 the periods without rain are short, and occurred at such stages of the growth of the crops that they did not affect the crops adversely. The two crops of this season not only received a fair amount of rain, but they also benefited by the distribution of the rain.

The total amount of rain received by these crops was 35.34 inches. The *maha* season crop 1935-36 received a total amount of 38.53 inches of rain. But the distribution was not, on the whole, so favourable. The rainfall curve for this crop shows that an almost continuous dry period extending over 33 days, broken only by two good showers amounting to less than 4 inches of rain, preceded the flowering of this crop. This is reflected in the difference in the yields of the two crops obtained on plot 180 in the two *maha* seasons (*vide* table I). The lack of moisture in the soil definitely affected the nutrition of the paddy plants and consequently the formation of seed.

The *yala* crops of both 1936 and 1937 suffered from a deficient rainfall as well as from its unequal distribution. The 1936 *yala* crop drilled on 3rd April of that year was at first exposed to practically drought conditions relieved by 1.59 inches of rain on the 20th April and followed again by an entirely dry period of 13 days before the first shower of May. The May rainfall revived the crop with several good showers between the 6th and 10th of that month. The crop was 50 per cent. in flower on the 25th May, and this period coincided with a period of continuous rainfall from the 19th to the 31st May of 0.15, 1.15, 0.31, 1.77, 2.43, 1.91, 1.09, 1.38, 0.56, 0.21, 0.42, 0.29, 3.08 inches on the successive days. As a consequence, setting of seed was affected and a large quantity of empty seed resulted. Though the month of June followed with only 4.23 inches of rain in light showers, the moisture in the soil as a result of the rainfall in the latter half of May

maintained the growth of the crop which might otherwise have resulted in the seed not fully forming. However, this crop contrasts with the 1937 *yala* crop in that the rainfall conditions were far less adverse, and the yield of 25·25 bushels per acre was not unsatisfactory compared with the performance of *Pachchaiperumal* paddy in other parts of the Island under irrigation.

The 1937 *yala* crop which was drilled between the 5th and 7th April similarly grew under almost drought conditions. Drilling followed rain on the 3rd and 4th April of ·61 and ·68 inches respectively. During the next twenty-three days of April a total of 2·69 inches of rain fell on 13 days, 1·28 inches of this falling on the 10th and 11th April. The month of May had a total of 5·49 inches over 14 days, of which 1·53 inches fell on the 5th May and 2·23 inches on the 26th May, while the long intermediate period of 21 days had 1·04 inches on 6 days. The rainfall curve illustrates these facts very clearly. The result was that growth was checked from the very start and the plants were thin and yellow. Tillering was very poor, and weed growth was troublesome. The July rainfall of 10·92 inches with a few heavy showers was of no special benefit to the crop, and the yield was only 10·5 bushels of good seed.

It would, therefore, appear that the vitality of the plant and its proper nourishment chiefly depend on the amount of moisture in the soil. A sufficient rainfall well distributed throughout the full period of growth, with mild showers only during the flowering period, may be considered to be the optimum conditions for the cultivation of mud paddy on unirrigated land. The first six weeks of growth and the periods before and after flowering are critical periods for the crop with regard to the rainfall.

Rainfall is seen to be the decisive factor, and this is only to be expected. The moisture-retaining capacity of the soil is a related factor. Its effect can be seen in the *maha* season cultivations on plot 180, and on plots 14 and 15. Plots 14 and 15 are clay loams, while the soil in plot 180 is in part sandy and in part a sandy loam. In the *maha* season, 1936-37, *Vellai Illankalayan* was sown on all three plots and grew under the

same climatic conditions. The difference lay in the texture of the soil and in the treatment of the plots in preparation for cultivation. Apart from the amelioration of the soil with lime, plots 14 and 15 carried a heavier green manure crop, *C. juncea*, than did plot 180 on which *C. anagyroides* and *T. candida* were the green manures. Besides, plots 14 and 15 received an additional ten tons of compost. The difference between the yields of these plots was 11.85 bushels per acre. This difference was doubtless largely due to the superior manurial value of the material ploughed into plots 14 and 15, but it is also considered that the greater moisture-retaining capacity of the soil of these plots enhanced by the effects of the compost were also in some measure responsible for the higher yield. Further trials on these plots were expected to demonstrate this inference more conclusively. The very poor yield from plot 180 in the *yala* season, 1937, has also partly to be attributed to the poor moisture-retaining capacity of the soil in this plot.

In India drilled paddy has been successfully grown under a rainfall of 35 inches per annum in the Broach district. This is achieved by proper soil management. Ploughing to a depth of 4 inches to 6 inches followed by repeated harrowing, the application of farmyard manure, and light intercultivation to prevent loss of moisture from the soil are practised. The problem is one of retaining moisture in the soil.

Both varieties of paddy have taken a longer period to mature under the conditions of these trials than when grown under irrigation. *Pachchai-perumal*, a three-months' paddy on irrigated fields, has taken up to 4 months and 10 days; *Vellai Illankalayan*, a four-months' paddy, has taken 4 months and 26 days, whether broadcast or drilled. It is known that transplanted paddy takes longer to reach maturity, the extra period varying appreciably with the distances apart of transplanting. This is considered to be due partly to the greater spacing of the plants. The same effect could have been expected between seed broadcast and drilled. Reference to table I shows that under the conditions of the trials now described the one instance of broadcasting has made no difference to the period of maturity compared with the drilling.

Although the climatic conditions that prevailed in both *yala* seasons under reference were adverse to the crop, the yield of 25·25 bushels of *Pachchai perumal* in 1936 shows that it is suitable for growing on dry land without irrigation. *Vellai Illankalayan* proved eminently suited for the purpose.

It may be concluded that mud paddies can be cultivated on dry lands in the absence of irrigation facilities under the conditions discussed above. This is worthy of trial as it is a potential method of increasing the output of paddy in this country where the required conditions of soil and rainfall are obtained in many districts.