Yield of Ginger as Influenced by Cultural Practices and Time of Planting

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I. INTRODUCTION

GINGER, ZINGIBER OFFICINALE, IS AN important spice crop of Kerala. It is cultivated in about 23,000 acres of land producing about 10.000 tons of Ginger per year which is 70 percent of the total production of ginger in India. The crop is raised purely as a rainfed crop in Kerala.

In Malabar, Ginger is cultivated observing a three year rotation with gingelli and dry paddy or with ragi and chillies. The land is ploughed at the commencement of the hot whether after the harvest of the preceding crop. It is then left until early showers are received in May or early June when the actual cultivation operations of the crop are started. Planting of ginger rhizomes is undertaken by the 1st Week of June. The seed bits take about 45 days germinate and by the time they start producing tillers it will be well nigh July-August. But in fields where ginger was raised in the preceding season, plenty of tillers are seen emerging from the soil from the stranded bits of rhizomes soon after the summer showers are received, and start outgrowing the planted crop of Ginger in the vicinity. Both the self-grown ginger and the cultivated ginger come to harvest only in December-January, the self-grown ginger getting 8 months duration while the latter gets only six months.

Therefore finding out the optimum time of planting seed rhizomes of ginger for better growth and increased yield was a major item of study in the Ginger Research Scheme, Ambalavayal, which is under the joint auspices of the Indian Council of Agricultural Research and the State Government.

II. MATERIALS AND METHODS

The experiment was laid out on land of the Agricultural Research Station, Ambalavayal and the type of ginger used for the trial in all the years was Wynad Local". The lay out adopted for the trial was that of a "Split plot" design with the factors "Varying number of Tith'' as the main plot treatments and the Times of Planting '' as the sub-plot treatments. The details of the experiment conducted are set out in Table I.

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TABLE 1.

Design : Split plot.

Replications : Six

Treatments

Main plot treatments.

(1) Digging before planting.
(2) Ploughing three times.
(3) Ploughing six times.
(4) Ploughing nine times.

These treatments were further replaced by three treatments furnished below from the year 1956-57 on wards.

(1) Ploughing once.
(2) Ploughing three times.
(3) Ploughing five times.

Sub-plot treatments

(1) Planting on 1st May.
(2) Planting on 15th May.
(3) Planting on 1st June.
(4) Planting on 15th June.

Plot size

Gross 8′ x 22′
Net 6′ x 20′

The experiment was started in the year 1955–56 with the treatments given in table I. The results of yield data obtained in the year strongly favoured a trial with date of planting earlier than 1st May, and hence one treatment of planting seed rhizomes on 15th of April was included in the experiment and the very late planting on 15th June was deleted; the experiment was laid out accordingly in the year 1956-57. The experiment was repeated using the same treatments until 1958-59.

The main plot treatments, viz. varying number of tilth have not given any statistically significant result in all the years from 1955–56 to 1958-59. Hence that factor was deleted and more useful factor viz :- different mode of storage of seed rhizomes has been substituted in its place. Again the results of all the years favoured a trial with date of planting earlier than 15th of April and hence a treatment of planting seed rhizomes on 1st of April was included in the treatments and the very late planting treatment by 1st of June was deleted. The experiment was laid out accordingly in the year 1959-60 with the modifications as detailed in table II.

TABLE II

Design	Split plot
Replications :	Six.

Treatments :-

Main plot treatments

(1) Storing seed rhizomes in the Pit.
(2) Storing seed rhizomes in the Field.
(3) Storing seed rhizomes in the Open.

Sub-plot treatments

(1) Planting seed rhizomes on 1st April.
(2) Planting seed rhizomes on 15th April.
(3) Planting seed rhizomes on 1st May.
(4) Planting seed rhizomes on 15th May.

plot size :

Gross	8′ x 22′
Net	6′ x 20′

III. RESULTS AND DISCUSSIONS

The Statistical analysis of the yield data gathered in the years from 1955-56 to 1959-60 are presented in the tables III to VII.

TABLE III

1955–1956.

Main plot treatments.

Main plot treatment	Total yeild of Ginger (lb)	Yield of finger lb/acre	Percentage on general mean.	Standard error	F. Test P=0.05	Critical difference
1	2	3	4		6	
1. Digging before planting	873.5	13212	96.3			
2. Ploughing thrice	896.0	13552	98.8			
3. Ploughing six times	944.0	14278	104.0	4.9	No.	
4. Ploughing nine times	915.5	13847	100.9			
General mean	907.2	13722	100.0			

Sub-plot treatments.

Treatments						
1	2	3	4	5	6	7
1. Planting on 1st May	1212.5	18339	133.7			
2. Planting on 15th May	963.5	14573	106.2			
3. Planting on 1st June	768.0	11616	84.7	3.05	Yes.	6.108
4. Planting on 15th June	685.0	10360	75.5			

Conclusions.

Main plot treatments : Not significant.

Sub-plot treatments 1 2 3 4.

A GOOD CROP OF GINGER PLANTED EARLY

TABLE IV,

Variante under study :- Ginger yield.
General mean 22345 lb. per acre
Standarderror Main plot 309 **lb** per acre
Sub-plot 249 lb per acre

Main plot treatments.

Treatments	Yield of ginger per acre	Percentage on General mean	Standard error per acre	F. Test Satisfied or not	Critical difference
1	2	3	4	5	6
1. Ploughing once	22325	99.9			
2. Ploughing two times	22688	101.5	309	No.	..
3. Ploughing five times	22022	98.6			
General mean	22345	100.0			

Sub-plot treatments

Treatments					
1	2	3	4	5	6
1. Planting on 15th April	27427	122.5			
2. Planting on 1st May	25108	112.4			
3. Planting on 15th May	19965	89.3	249	Yes	498
4. Planting on ; s June	16880	75.6			
General Mean	22345	100.0			

Conclusions.

Main plot treatments Not significant
Sub plot treatments : 1 2 3 4.

1957-58

TABLE V.

Variante under study :- Ginger yield

General mean 13037 lb. per acre

Standard error Main plot 269.27 lb. per acre

Sub-plot 222.12 lb. per acre

Main plot treatments.

Treatments	Yield of Ginger (lb. per acre)	Percentage on general mean	Standard error per acre	Treatment differences significant or not P=0,5	Critical differences
1	2	3	4	5	6
1. Ploughing once	12938	97.7			
2. Ploughing three times	13444	103.1	269.27	No	
3. Ploughing five times	12731	99.2			
General mean	1 3037	100.0			

Sub-plot treatments.

Treatments					
1	2	3	4	5	6
1. Planting on 1 5th April	1 8288	140.2			
2. Planting on 1st May	14952	114.7			
3. Planting on 15th May	11166	85.7	222.12	Yes	444.24
4. Planting on 1st June	7744	59.4			
General mean	13937	100.0			

Conclusions.

Main plot treatments Not significant

Sub-plot treatments 1 2 3 4.

TABLE VI.

Variante under study.	Ginger yield.
General Mean.	6.05 tons per acre.
Standard error of the experiment.	Main plot 1.16. Sub-plot 1.02

Table of mean yields in tons per acre.

	1 Ploughing.	*3 Ploughing*	5 *Ploughing*	*Mean*
15th April.	9.28	9.45	10.49	9.74
1st May.	6.84	5.65	6.77	6.42
15th May.	5.04	4.58	5.30	4.96
1st June	3.23	2.85	3.21	3.10
Mean.	6.09	5.63	6.44	6.05

S E. of the Experiment
Main plot 1.16
Sub-plot 1.02
S. E. of differences of two marginal means. (Ploughing) 0.31

S. E. of differences of two marginal means (dates of planting) 0.32.
S. E. of differences of two 'Plough' means for the same date of planting 0.56.
S. E. of differences of two dates of planting means for the same level of ploughing 0.55.

Statistical significance :– The different dates of planting are significant at 1% level. Its linear and quadratic components are significant at 1% level and cubic component significant at 5% level.

Conclusions:— Increased number of ploughings has not contributed much in increasing the yield. Date of planting affects the yield very much and earliest planting by 15th April gives the highest yield.

1959-60

Analysis of yield date.

Analysis of variance table.

TABLE VII

Source	S. S.	D. F.	Variance.	F.	Inference
Total	13976.32	53			
Block.	2658.90	6	443.15	6.41	xx
Main plot treatments.	2123.64	7	1061.82	15.34	xx
Main plot error.	830.53	12	69.21		
Sub plot treatments.	6270.51	3	2090.17	219.04	xx
Interaction	365.31	6	60.89	< 1	
Sub plot error.	1727.43	24	71.98		

Inference:— 1. Block effects are significant.

2. The method of storing of seed material gave significantly different yields as seen from the tabular form below

	Mean yield per pit	As percent of yield of the last method.
In the field.	39.1	145.9
In pits.	33.7	125.7
In the open.	26.8	100.0

The critical difference is 9.7,

The times of planting also give significantly different yields, The average yields are furnished below.

Time of planting.	Mean yield per plot.	As per cent of lowest yield.
April 1.	44.0	213.6
April 15,	37.5	182.0
May 1.	30,7	149.0
May 15,	20.6	100.0

The critical difference is 5.4. and hence all the periods are significantly different from each other.

Conclusions:—Storing in the field is found to be the bsst method. Date of planting affects the yield very much and the earliest planting by 1st April gives the highest yield.

IV. SUMMARY AND CONCLUSIONS

To find out the optimum time of planting seed rhizomes of ginger for better growth and increased yield, an experiment was laid out in a split plot design with varying number of tilth as the main plot treatment and different times of planting as the sub plot treatments from 1955-56 on wards. During the year 1955-56, earlier planting by 1st of May gave the highest yield. The experiment strongly suggested a trial with date of planting earlier than 1st of May and hence during the next year i.e. 1956-57 a treatment of planting on 15th April was also included. The experiment was continued with the same treatments until 1958-59. In all the years, early planting, by 15th of April gave signicantly higher yield and even small delays in planting reduced the yield appreciably. These results again strongly suggested a trial with date of planting earlier than 15th of April. Hence during the next year i.e. 1959–60 a treatment of planting seed rhizomes by 1st of April was included. The main plot treatments of varying number of tilth did not give any statistically significant result in any of the years from 1955-56 to 1958-59 and hence that factor was deleted. A more useful factor of different mode of storage of seed rhizomes was substituted **in** its place and the experiment was laid out accordingly in the year 1959-60. Satistical analysis of yield data obtained during the year revealed that date of planting of seed rhizomes affected the yield very much and the earliest planting by the 1st April gave the highest yield. Storing the seed material in the field was found to give better results.

To sum up, planting seed rhizomes of ginger early by 1st of April gives significantly higher yield than the traditional way of undertaking planting of seed rhizomes during the month of June.

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