

3680

GOVERNMENT OF TRAVANCORE-COCHIN



BOARD OF STATISTICS

REPORT

ON

CROP-CUTTING SURVEY
ON KUMBHOM CROP OF PADDY
IN
TRAVANCORE

1951

PRINTED BY THE S.G.P., AT THE GOVERNMENT PRESS,
ERNAKULAM—1951

REPORT ON CROP-CUTTING SURVEY ON KUMBHAM CROPS OF PADDY IN TRAVANCORE—1951

1. Crop-cutting experiments conducted in randomly selected fields have recognised now as the only rational and scientific way of estimating the average and total yield of a crop in a locality. Still, it is only comparatively recently that this method has been used on a large scale for crop estimation. During 1923-25, Sir John Hubback used it in Bihar and Orissa though not in so refined and scientific a way as it is now used. Later Sir C. D. Deshmukh employed Hubback's method to revise the settlement of Raipur District, C.P. and Berar (Madhya Pradesh). But it is the Indian Council of Agricultural Research that has been responsible for using the random sampling method for crop estimation extensively in the various States of India.

2. In Travancore-Cochin, a preliminary survey was carried out in March 1950 on the Punja crop in Kuttanad and neighbouring areas under the auspices of the University Bureau of Statistics. 1030 experiments were conducted in thirty-six pakuathies of six Taluks, namely Ambalapuzha, Kottayam, Changanacherry, Thiruvalla, Mavelikara and Pathanamthitta. Average and total yields for these pakuathies with the respective standard errors were worked out. Another survey, conducted on Kanni crop of paddy in September-October 1950, was planned to cover 28 out of the 36 Taluks of the State. Two Taluks Deviculam and Peermade in Travancore and all the six Taluks of Cochin were left out of the survey. The former two were omitted because the area under paddy in these two Taluks was only a negligible fraction of the total paddy growing area in the State and the latter Taluks were left out because there were no proper statistical staff there. The plan of sampling adopted was what is technically known as "Stratified Multi-stage Random Sampling". A total of 397 karas were selected in all and the plan was to conduct five experiments in each kara. But owing to many reasons, some of the fields selected were harvested earlier than the dates previously fixed and thus were not available for experimentation. A total of 303 experiments were thus lost and only 1682 were actually conducted.

3. The present report deals with the third survey in this series conducted on the Kumbham crop of paddy in the State. Of the two major crops of paddy in the State, the Kanni and the Kumbham, the latter is the better one with regard to the average yield per acre, and the total extent of cultivation. The sowing season of this crop extends over the three months September, October and November and the harvesting season over January, February and March. For reasons given above, this survey also was confined to 28 Taluks out of the total number of 36 Taluks. Recently Statistical Staff have been appointed in the Taluks of Cochin also and it will be possible to extend the survey to the whole State from next Kanni crop onwards. The object of the present survey was two-fold:—

(i) To get estimates of the average yield per acre and the total out-turn of Kumbham crop of paddy in the different Taluks.

(ii) To assess the beneficial effects, if any, of Grow More Food Aid.

4. The plan of sampling adopted was very much the same as the one followed for the survey on Kanni crop in 1950. The number of Karas to be included in the survey was fixed to be 397 as before which is about a tenth of the total number of Karas in the 28 Taluks. The number of Karas allotted to each Taluk was in proportion to the area under paddy in it. The Karas in each Taluk were selected strictly at random and from every Kara thus selected a random sample of five paddy growing fields was chosen. In each of these fields a plot of square shape measuring $16\frac{1}{2}'$ by $16\frac{1}{2}'$ was proposed to be located at random, the crop harvested and the produce threshed, winnowed and weighed. The selection of the Karas and fields was done in the Bureau of Statistics lest considerations of distance or accessibility should weigh in the selection affecting the random character of the fields chosen.

5. The field staff engaged in the actual execution of the survey consisted of the Statistical Assistants and Field Assistants of the section of Agricultural Statistics. In a few Taluks where the volume of work was particularly heavy, special Investigators were appointed. Altogether four

Investigators were thus appointed. Eventhough the Statistical Assistants were trained in the technique of the survey during the previous occasion, the Field Assistants and special Investigators who were newly recruited lacked such training. Three Research Officers from the Division of Statistics in the University toured round all the Taluks and imparted this training prior to the commencement of the field operations. The supervision of the field work was also undertaken by these Research Officers.

6. In the light of the experience gained during the two previous surveys, every precaution was taken to make nearly all the selected fields available for experimentation. Still, it was possible to conduct in all only 1927 experiments as against the proposed number of 1985. An encouraging feature of the present survey was that it was possible to get the co-operation of the cultivators and owners of the fields in a larger measure than on the previous occasions thus marking a definite trend on the part of the public to realise the importance and usefulness of the work to a greater extent. The field staff had to visit each field twice during the period, the first one for contacting the owners and fixing the date of harvest and the second for harvesting and weighing the produce. On the whole the survey proceeded smoothly in accordance with the instructions issued to the field staff.

7. Results reported by the field staff related to the weight of paddy obtained from the plot immediately after harvesting and threshing. The moisture content of the paddy naturally varied from field to field and from Taluk to Taluk. In order to estimate the loss in weight due to drriage, a sample of grain was taken from every tenth plot harvested and sent to the headquarters on the same day in air-tight bottles specially provided for the purpose. As soon as each bottle reached the headquarters, the content was weighed and dried and then re-weighed. Thus the loss in weight was determined for each sample and a weighted average of these for all the samples from a particular Taluk was calculated to give the reduction due to drriage for that Taluk. The returns further contained the survey number, area and the length and the breadth of each selected field, the random numbers chosen for fixing the plot within the field and the nature of the Grow More Food Aid received, if any.

8. The analysis of the data collected, was done in the Bureau of Statistics. The results obtained are detailed in Tables I to V given at the end of this report. Table I gives the acreage under paddy, the number of experiments conducted, the estimated average yield per acre and the total out-turn of dry paddy, the total out-turn of rice and the percentage standard error for the 28 Taluks seperately and collectively. The figures for the standard errors are an index of the accuracy that may be expected in the estimated average yield and total out-turn. It is well established in current statistical theory that the true average yield and total out-turn will not differ by more than twice the standard error in either direction. Thus for all practical purposes it may be taken to be certain that the total outturn of dry paddy for the 28 Taluks together will lie between 295484 ± 6796 tons. Table II gives the estimated acreage under paddy, the number of experiments, the mean yield of dry paddy per acre and the corresponding standard error both for fields which received Grow More Food Aid and which did not receive any aid. The acreages under aid and no aid had to be estimated since no correct figures were available otherwise. As the fields in which the experiments were conducted were selected at random the estimate of the acreage under Grow More Food Aid in a Taluk was obtained by multiplying the total area under paddy in the Taluk by the proportionate area under Grow More Food Aid in the sample for that Taluk. The mean yields are the simple arithmetic averages of the corresponding plot yields. Since the number of experiments under the heads Grow More Food Aid and no aid differed considerably from Kara to Kara within the same Taluk, the standard errors of Taluk mean yields were calculated from the formula.

$$V(\bar{x}) = \frac{A}{N} + \frac{B-A}{m} \frac{\sum n_i^2}{N^2}$$

$$\text{Where } m = \frac{N - \sum n_i^2}{k-1}$$

$V(\bar{x})$ denotes the variance of the Taluk mean yield, A the mean square within karas, B the mean square between karas, N the total number of experiments, n_i the number of experiments

in the i th kara and k the number of karas sampled in the Taluk. The mean squares between karas and within karas are obtained from the analysis of variance Tables. Table III sets out the results of the analysis of variance of yields from plots receiving Grow More Food aid and no Aid separately. Applying the t-test it is found that Grow More Food Aid has produced significant increase in the average yield in 13 Taluks, viz.

- 1. Quilon
- 2. Kottarakara
- 3. Pathanapuram
- 4. Shenkottah
- 5. Kunnathur
- 6. Pathanamthitta
- 7. Thiruvalla
- 8. Karunagappally
- 9. Shertallai
- 10. Changanacherry
- 11. Vaikom
- 12. Muvattupuzha
- 13. Parur

SUMMARY

Crop-cutting experiments were conducted in 28 out of the 36 Taluks of the State on the Kumbham crop of paddy 1951. Altogether 1927 experiments were carried out, of which 851 were conducted in fields which received Grow More Food Aid and the rest in fields which received no aid. It has been found that Grow More Food Aid has produced significant increase in average yield per acre in 13 Taluks. The total out-turn of dry paddy and rice in the 28 Taluks as a whole is estimated as 295484 and 197086 tons respectively.

ACKNOWLEDGEMENTS

It is with great pleasure that I place on record our deep indebtedness to all those who have by their whole hearted co-operation endeavoured to make this survey a success.

The Revenue and Grain Purchase Tahsildars of the various Taluks deserve special mention in this connection. Our thanks are also due to the section of Mineral Survey and Research in the Department of Research which provided all facilities for drying and weighing the samples of paddy for estimating the loss in weight due to diriage.

Secretary,
Board of Statistics

TABLE I

Statement showing the estimated mean yield per acre and the total out-turn of dry paddy and rice in 28 Taluks

Taluk	Acreege under paddy	No. of experi-ments	Estimated mean yield of dry paddy (lbs. per acre)	Stan- dard error in lbs.	Estimated total out- turn of dry paddy (Tons)	Estimated total out- turn of rice (Tons)	Percentage standard error of estimated values
1	2	3	4	5	6	7	8
Thovala	12978	40	3116	108	18053	12041	3.47
Agasteeswaram	23025	80	2270	111	23333	15563	4.89
Kalkulam	18474	70	1892	71	15604	10408	3.75
Vilavancode	8366	20	1129	107	4217	2813	9.48
Neyyattinkara	11902	50	1399	131	7433	4958	9.36
Trivandrum	8425	40	1300	117	4890	3262	9.00
Neduman.gad	12440	40	1527	114	8480	5656	7.47
Chirayankk	11549	32	1392	191	7177	4787	13.72
Quilon	10756	50	996	90	4783	3190	9.04
Kottarakara	16148	60	1827	71	13171	8785	3.88
Pathanapuram	10595	40	1612	91	7625	5086	5.65
Shenkottah	7361	20	2024	207	6651	4436	10.22
Kunnathur	10531	45	1542	204	7249	4835	13.23
Pathanamthitta	5884	20	1697	67	4458	2973	3.95
Thiruvalla	17895	105	904	40	7222	4817	4.42
Mavelikara	12362	86	1313	68	7246	4833	5.18
Karunagappally	20002	60	1145	92	10224	6819	8.03
Karthikappally	22449	80	1363	82	13660	9111	6.02
Ambalapuzha	49691	183	1266	45	28084	18732	3.55
Shertallai	7112	65	638	20	2026	1351	3.14
Changanacherry	17202	75	1504	47	11550	7704	3.13
Kottayam	34778	105	1373	65	21317	14218	4.73
Vaikom	20317	69	1125	80	10204	6806	7.10
Meenachil	4180	30	1173	122	2189	1460	10.40
Thodupuzha	9267	25	1602	130	6628	4421	8.12
Muvattupuzha	20024	135	1719	45	15367	10250	2.62
Kunnathunad	33393	202	1255	50	18709	12479	3.98
Parur	12024	100	1478	65	7934	5292	4.40
Total	449130	1927	1474	17	295484	197086	1.15

TABLE II

Statement showing mean yield of dry paddy per acre with its standard error for fields which received G.M.F. Aid and No Aid

Taluk	Fields which received G.M.F. Aid				Fields which received no Aid			
	Estimated acreage under paddy	No. of experiments	Estimated mean yield of dry paddy (lbs. per acre)	Standard error in lbs.	Estimated acreage under paddy	No. of experiments	Estimated mean yield of dry paddy (lbs. per acre)	Standard error in lbs.
1	2	3	4	5	6	7	8	9
Thovala	4154	13	3288	152	8824	27	3035	142
Agasteeswaram	13999	50	2333	140	9026	30	2172	180
Kalkulam	10715	38	1942	68	7759	32	1823	141
Vilavancode.	1472	5	1913	108	6894	15	962	404
Neyyattinkara	4370	19	1478	198	7532	31	1353	173
Trivandrum	885	4	1619	249	7540	36	1263	127
Nedumangad	3945	9	1670	227	8495	31	1461	129
Chirayinkil	7587	18	1452	280	3962	14	1278	149
Quilon	1262	11	1392	133	9494	39	943	100
Kottarakara	8835	30	2002	114	7313	30	1616	77
Pathanapuram	4652	25	1907	179	5943	15	1381	83
Shenkottah	6545	18	2138	232	816	2	1114	205
Kunnathur	9961	40	1590	216	570	5	703	110
Pathanamthitta	5511	19	1757	71	373	1	818	..
Thiruvalla	6183	33	1132	65	11712	72	783	50
Mavelikara	9164	57	1356	86	3198	29	1248	94
Karunagappally	478	3	1555	334	19524	57	1135	96
Kerthikappally	8304	30	1432	108	14145	50	1323	114
Ambalapuzha	19896	64	1168	50	29795	119	1332	67
Shertallai	1055	7	727	60	6057	58	623	21
Changanacherry	16935	69	1510	48	267	6	1109	184
Kottayam	27635	69	1393	81	7143	36	1297	57
Vaikom	9015	22	1361	121	11302	47	937	107
Meenachil	4063	28	1168	126	117	2	1358	34
Thodupuzha	7823	20	1671	152	1444	5	1235	148
Muvattupuzha	5394	38	2137	100	14630	97	1565	50
Kunnathunad	5466	60	1209	69	27927	142	1264	60
Parur	7131	52	1641	86	4893	48	1240	98
Total	212435	851	1615	26	236695	1076	1347	22

TABLE III
Analysis of Variance of plot yields lb.

Taluk	Plots which received G.M.F. Aid				Plots which received No Aid			
	Between Karas		Within Karas		Between Karas		Within Karas	
	D. F.	M. S.	D. F.	M. S.	D. F.	M. S.	D. F.	M. S.
Thovala	4	11.85	8	8.12	7	20.58	19	9.78
Agasteeswaram	14	34.90*	35	7.14	12	33.97	17	19.04
Kalkulam	12	6.84	25	6.19	8	23.49*	23	8.45
Vilavancode	..	..	4	2.28	2	95.83*	12	0.92
Neyyattinkara	9	18.74	9	6.32	7	36.07*	23	9.66
Trivandrum	3	9.81	..	..	7	22.34*	28	4.64
Nedumangad	5	13.88*	3	1.26	7	19.85	23	13.32
Chirayinkil	5	43.83*	12	13.92	3	13.76*	10	3.33
Quilon	4	7.55	6	7.34	9	14.02*	29	1.51
Kottarakara	9	13.36	20	6.06	9	5.77	20	6.87
Pathanapuram	7	14.36*	17	1.70	6	0.15	8	3.99
Shenkottah	3	36.70	14	11.97	..	..	1	3.27
Kunnathur	7	72.78*	32	7.83	..	..	4	2.38
Pathanamthitta	3	3.69	15	2.68	..	..	..	..
Thiruvalla	12	4.16*	20	0.39	17	6.52*	54	0.38
Mavelikara	13	14.44	43	8.81	9	8.99*	19	3.36
Karunagapally	1	10.55*	1	0.39	11	20.37*	45	2.98
Karthikappally	12	11.50*	17	0.78	15	22.36*	34	5.16
Ambalapuzha	21	6.32	42	6.22	29	19.98*	89	4.86
Shertallai	4	0.70	2	0.73	12	0.77	45	0.95
Chenganacherry	13	6.31	55	4.07	1	0.96	4	7.90
Kottayam	17	16.74*	51	3.43	13	..	22	4.58
Vaikom	7	10.83	14	5.89	12	19.19*	34	2.88
Meenachil	5	16.81*	22	3.10	..	..	1	0.09
Thodupuzha	4	17.12	15	3.24	2	3.83*	2	0.16
Muvattupuzha	18	12.44*	19	2.68	26	8.99*	70	4.05
Kunnathunad	20	9.18*	39	2.78	35	18.30*	106	3.36
Parur	10	15.04	41	10.03	10	17.16*	37	7.80

*Significant at 5%

TABLE IV
Percentage reduction due to driage in the different Taluks

Taluk	% reduction	Taluk	% reduction
Thovala	10.8	Thiruvalla	15.1
Agasteeswaram	10.2	Mavelikara	12.5
Kalkulam	10.7	Karunagapally	11.6
Vilavancode	15.2	Karthikappally	14.4
Neyyattinkara	10.2	Ambalapuzha	15.4
Trivandrum	14.8	Shertallai	14.8
Nedumangad	9.9	Chenganacherry	12.5
Chirayinkil	10.6	Kottayam	13.4
Quilon	12.6	Vaikom	9.6
Kottarakara	10.1	Meenachil	17.2
Pathanapuram	10.1	Thodupuzha	11.8
Shenkottah	18.1	Muvattupuzha	10.3
Kunnathur	15.5	Kunnathunad	11.3
Pathanamthitta	7.1	Parur	7.4

1122

