

F O R E W A R D

A large part of available information on agriculture, is usually to be found on government records. The difficulties and delays in their compilation and publication are to be faced by almost all institutions and authors. In order to overcome this difficulty, Department of Agriculture has decided to cyclostyle them in the present form. This is the first of the series of such bulletins to follow. These bulletins- it is hoped- will make available information on agriculture in Gujarat State in the shortest possible time.

Many exaggerated reports of damage by insects and rodents to food grains have appeared in recent past. Persons connected with research and extension education of Plant Protection were not perturbed at such unwarranted, publicity conscious reports; but at the same time, they were keen to assess it on a scientific basis. The present bulletin is a result of such desire. More than anything else, this bulletin should set at rest, wild speculation incidental to exaggerated reports. Further, the bulletin will have justified its publication if it enables general readers to understand how scientific surveys are essential to know, hitherto ill-defined area of knowledge.

This survey is a work of many individuals. It is the result of collective efforts by the staff of the State Agricultural Entomologist, & statistical section of Department of Agriculture, whose efforts are greatly appreciated.

AHMEDABAD-6,
DT. 24TH MARCH, 1970.

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Director of Agriculture.

M/25/3/

THE INCIDENCE AND EXTENT OF INFESTATION ON FOOD GRAINS
STORED BY THE CULTIVATORS IN GUJARAT STATE, YEAR, 1966.

In recent past considerable attention has been paid and public awareness created with regards to losses of food grains. Though, as in all agricultural products, insects take away a portion of man's efforts, the actual losses on this account have not been accurately assessed. The figures have ranged between wide extremities.

The introduction of grain rationing after World War II and consequent responsibilities of Government for storage of grains led to the necessity of its protection in scientific manner. The steps being taken to prevent such losses have led to minimising losses in storage. Such operations are regular features in Government godowns. However, the scientific storage and pest control measures for grains stored by farmers have not yet extended to farmers, who also store grains to considerable extent. It is also observed that farmers and consumers in Gujarat do take considerable care of their grains by traditional methods, however this observation may be true for certain categories only.

In absence of statistics and many exaggerated reports being circulated, Government of India appointed a committee to assess losses of food grains during post harvest handling and storage.

It was reported by the said committee that during storage, losses due to insects account for the maximum loss. The said committee worked out loss on the basis of loss in the food value. Quantitative loss caused by insects was quantified on the basis that each kernel damaged by insects has lost on an average, half the food value. The committee felt that the insect damage varies between slight to considerable and the portion of remaining kernel has sizeable food value. The losses in various food grains

due to insects in storage reported by the said committee are presented here below:-

<u>Sr.No.</u>	<u>Crop</u>	<u>Percentage</u>
1.	Wheat	3.0
2.	Rice	2.0
3.	Jowar	2.0
4.	Bajri	1.0
5.	Maize	3.0
6.	Grams	5.0
7.	Millet s	5.0
8.	Pu. ses (Other than Gram)	5.0
	Average	----- 2.55 -----

In order to assess the insect infestation, the Department of Agriculture, Gujarat State conducted a survey in 1966. Since the objective was to create a factual base for extension work in farmers' home, the survey was confined only to storage by farmers. The observations were confined to extent of infestation by weight and number of grains. Attempt was also made to assess incidence in relation to period of storage, and methods of storage used.

Sampling Plan:- Sampling design adopted was one of two stage stratified random sampling with taluka as stratum, village in the taluka as a primary unit of sampling and a cultivator in the selected village cultivating more than 10 acres of land as an ultimate unit of sampling.

To keep the work load to manageable size it was decided to select 5 villages from each of the talukas and from each selected village in the taluka, two cultivators were selected. The selection of villages in the taluka and the cultivators in the selected villages was done according to simple random

sampling method.

Organization of the field work:- The field work actually consisted of visiting the selected villages, selection of two cultivators cultivating 10 acres or more than 10 acres of land and drawing two samples of the grain stored for each type of grain. Instructions were issued to have one sample from the upper layer and the other sample from the bottom layer from the grains stored by the selected cultivators.

The field agency comprised of agricultural supervisors working in different schemes in the State viz:(i)Improvement of Agricultural Statistics, (ii) Special Supervisory check on Cotton, (iii) Cotton Development Scheme (iv) Oilseed Extension Scheme and (v) Tobacco Extension Scheme.

All the field workers were instructed to fill up the required prescribed schedules and send the samples of grains drawn in a fashion explained earlier, to the agricultural entomologist, Junagadh for identification of the stored grains pests and determining the percentage damage.

Necessary training was imparted at two centres viz:(i)Baroda and (ii) Junagadh wherein the field staff was trained in the conduct of the survey. The columns of the schedules were explained in detail so as to avoid ambiguity on any of the items.

The field staff was instructed to visit the selected villages twice in a year. Once for the Kharif-stored food grains and second time for the rabi-stored food grains.

In all 1830 cultivators were selected from 915 villages for collecting required information and stored food grain samples. As against this information in the prescribed schedules could

be collected from 970 cultivators from 915 villages. Thus percentage response works out to be 53%.

Samples could be collected from 53% of the planned villages for Kharif crops while samples for rabi crops could be collected only 7% of the villages. Due to unfavourable seasonal conditions during the year, failure of c-crops was extensive and hence cultivators did not have grains stored with them, which seems to have resulted in less number of total samples drawn. The food grain wise number of samples drawn is given below:-

<u>Food grains</u>	<u>No. of samples drawn</u>
1) Bajri	1116
2) Jowar	661
3) Wheat	1075
4) Paddy	245
5) Maize	83
Total:-	----- 3180 -----

The samples of food grains were analysed for determination of pests responsible for the damage and percentage damage in relation to the period of storage.

Discussion of the Results:-

The percentage damaged grains for grains stored for varied periods in respect of food grains, are shown in table No.1. The number of samples analysed for Bajri, Jowar, Wheat, Paddy and Maize were 1116, 661, 1075, 245 and 83 respectively.

In case of Bajri the period of storage was considered from November onwards. Out of 1116 samples analysed as many as 13.71% as old as 18 months. 12.37% of the samples were of the samples were 10 months old while only 0.5% of the samples were four months old. It can thus be seen that Bajri grains are stored for periods ranging from 4 months to 18 months

and normal storage can be said to range from 5 months to 10 months.

In case of Jowar, the period of storage varies from 3 months to 19 months. However, in majority of the cases this period ranges from 3 months to 15 months. In as many as 17.55% of the cases, Jowar was stored for 15 months while in 16.79% of the cases it was stored for 11 months.

In case of Paddy, storage period varied from 6 months to 18 months and out of 245 cases, 51.84% of the cases and was stored for a period of 15 months, while in 28.16% of the cases it was stored for a period ranging from 11 months to 13 months and in 17.55% of the cases it was stored for a period ranging from 11 months to 13 months and an equal quantity was stored for a period ranging from 6 months to 9 months.

In case of Wheat, 1075 samples were examined and it was observed that, it is stored for a period ranging from 2 months to 16 months. In 28% of the cases storage period ranged from 2 months to 5 months, while in 31.72 % of cases it is found to have been stored for the period ranging from 6 months to 10 months while in 40.28% of the cases it is stored for the period ranging from 11 months to 16 months.

An attempt is also made to study whether the extent of damage and period of storage are associated or not. As can be seen from table No.2 period of storage and damage are positively correlated. In case of Bajri, Jowar and Wheat, the co-efficient of co-rrrelation is highly significant, while for Paddy co-efficient of co-rrrelation is non significant. This can be due to smaller number of samples collected and analysed.

This finding supports the common belief that the damage to stored grains varies in proportion to the period it is stored.

Mode of storing:- The percentage grains stored in various containers is shown in statement No.3. It can be seen that storing the grains in earthen jars is the most common mode of storing grains. Storing in gunny bags ranks second. 78.47% of Mung grains and 85.40% of Math grains are stored in earthen jars, while 21.53% of Mung grains and 14.60% of Math grains are stored in gunny bags. Thus it can be said that for Mung and Math grains storing in earthen jars and gunny bags are the most common mode of storage. In case of Wheat grains 48.44% of the stored grains are stored in earthen jars while 25.61% are stored in gunny bags. Metal containers and wooden bins are also found to have been used for storing 8.43 and 9.58% of the stored Wheat respectively.

In case of Paddy 51.59% is stored in earthen jars, while 14.29% and 18.70% are stored in tin jars and wooden bins respectively. 9.81 and 2.18% are found to have been stored in "Palas" and Bamboo jars respectively.

In case of Bajri 64.01% stored in earthen containers and in 18.90% of the cases gunny bags are used. Metal containers and wooden bins account for 2.51 and 5.6% respectively.

In case of Jowar, storing in earthen jars, gunny bags and metal containers are the popular modes of storage and they account for 52.01%, 27.64% and 13.00% of the grains stored respectively.

Major stored grains pests causing damage:- Percentage of samples of various stored food grains affected by different stored grains pests are shown in table 4. It is observed that Lesser grains borer is found to have been present in 37.76% of the samples

of Bajri ,26.73% of Wheat samples, 47.67% of Paddy samples, 21.38% of Rice samples and 33.43% of the Jowar samples. While Lesser grain borer and Rust red flour beetle are jointly found in 17.20% of Bajri, 10.88% of Wheat, 5.81% of Paddy, 25.16% of Rice, and 9.59% of the Jowar samples. Lesser grain borer is observed in combination with (i) Rust red flour beetle (ii) Rust red flour beetle and Rice weevil (iii) Rice weevil (iv) Saw toothed grain beetle (v) Pulse beetle (vi) Flea beetle and (vii) Angunmois grain moth in varying proportions. Lesser grain borer in combination with Rice weevil moth was noticed in 3.46% of Bajri 7.47% of Wheat, 3.88% of Paddy, 7.55% of Rice and 9.74% of

--- Jowar samples. It was also observed that 32.89% of Bajri samples, 47.37% of Wheat samples, 37.21% of paddy samples, 13.84% of Rice samples, 25.29% of Jowar samples and 5.63% of Math samples were free from presence of stored grain pests. In case of Rice, Rice weevil, Rust red flour beetle, Saw toothed grain beetle were jointly observed in as many as 16.98% of the samples.

Preventive measures:- Extent of various types of preventive measures being adopted by cultivators for preserving stored grains is shown in statement No.5. It is observed that in case of 48.86% of Bajri grains stored, 61.31% of Wheat grains, 54.57% of Rice and Paddy grains, 64.57% of Jowar grains, 46.96% of Mung grains and 76.78% of Math grains no preservatives are used by the cultivators while for the remaining, the cultivators use Ash, Neem leaves, Kitox powder, washing soda, Castor oil and Tamarind leaves. Other types of preservatives were also found to have been used but the proportion seems to be negligible. Of all the preservatives used, the use of ash appears to be very prevalent. Ash is found to have been used as a preservative in 31.32% of Bajri samples 1.17% of Rice, 6.76%

of paddy, 8.72 % of Jowar 47.59% of Mung and 23.22% of Math samples while BHC was used in 6.14% of Bajri 12.47% of Wheat and 6.67% of Jowar samples.

Use of Neem leaves as a preventive measure seems common. As many as 13.87% of farmers use Neem leaves for the Rice or Paddy grains. Boric powder and Castor oil were also found to have been used for storing of 2.32% and 3.42% respectively of Wheat grains, 2.52% and 7.47% for Rice or Paddy grains respectively. The percentage of total production of grains used for seed, home consumption and sale is shown for various crops in table No. 6.

It appears that as much as 67.80% of the production of Bajri crop is used for home consumption by cultivators and from the remaining 32.20% of the grains 4.92% is meant for seed purpose and 27.28% is sold in the market. In case of Paddy the pattern is similar to Bajri but a higher percent (5.60%) is kept for use as seed and 26.41% is for sale. In case of Wheat the pattern is slightly different in as much as 11.19% is kept aside for seed, 62.61% is for family consumption and 26.20% is available for sale in the market. In case of Jowar crop as much as 74.81% is used for home consumption while 7.06% and 18.13% are meant for seed & sale respectively. In case of Mung and Math the pattern differs widely and a much larger proportion (62.25% and 44.94%) is sold in the market and comparatively lesser quantities (32.58% and 46.60%) used for home consumption. While the quantity kept aside for seed constitutes 5.17% & 8.46% of the quantities stored.

Conclusion:- Damage to grains by insects and period of storage are positively correlated. The rate of increase in percents of grain damaged per month is maximum in case of Bajri, it being

0.7% for every additional month's storage, while Jowar ranks second with 0.5% rate. In case of ^{Wheat it is 0.23%.} incidence is 4.64% for Bajri, 3.77% for Jowar, 2.03% for Wheat and 0.71% for Paddy. In case of Maize it is as high as 9.84%.

As regards stored grains pests, Lesser grains borer is found to be most common.

As for pattern of disposal of grains on an average 7.06% of the production is kept aside for seed incase of Bajri and Paddy while in case of Pulses 5.81% is kept aside for seed. In case of Wheat it is 11% so far marketable quantity is concerned, it is about 26% to 27% in case of Bajri, Wheat, and Paddy, while it is 62.25% and 44.94% in case of Mung and Math respectively.

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TABLE NO. I

Statement showing the percentage damage in relation to the period of storage in different commodities of the food grains

Name of the commodity.	Period of storage (in months)	Percentage damaged grain (average from the number of samples)	No. of samples examined.
Bajri	From October November on wards.		
"	4	0.25	5
"	5	0.33	43
"	6	0.66	122
"	7	0.70	135
"	8	0.77	112
"	9	1.72	93
"	10	3.73	138
"	11	5.64	56
"	12	6.20	15
"	13	8.90	75
"	14	5.97	56
"	15	3.00	21
"	16	3.03	15
"	17	6.82	77
"	18	14.30	153

% S.E. - 13.6

Mean percentage damage - 4.64%

Wheat	From March April -on wards		
"	2	0.32	56
"	3	0.80	90
"	4	0.37	81
"	5	0.66	75
"	6	0.20	56
"	7	2.81	53
"	8	0.85	72
"	9	3.42	151
"	10	1.79	65
"	11	4.01	46
"	12	3.50	69
"	13	3.00	117
"	14	0.44	39
"	15	3.44	82
"	16	3.84	23

Mean percentage damage = 2.03%

% S.E. 21.3

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TABLE NO. 1

Name of the commodity.	Period of storage (in months)	Percentage damaged grain (average from the number of samples)	No. of samples examined
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Jowar	From Octr. Novr., onwards		
"	3	0.05	3
"	4	0.58	41
"	5	1.37	20
"	6	0.34	33
"	7	0.62	52
"	8	1.78	70
"	9	1.05	28
"	10	5.07	39
"	11	8.88	111
"	12	2.40	7
"	13	1.50	21
"	14	3.05	94
"	15	5.49	116
"	16	3.90	12
"	17	15.00	2
"	18	6.70	4
"	19	4.55	8

Mean percentage damage 3.77

% S.E. 18.56

Paddy	"	6	0.25	19
"	"	8	0.10	7
"	"	9	0.65	10
"	"	10	0.30	7
"	"	11	0.37	26
"	"	12	0.63	33
"	"	13	0.20	10
"	"	14	0.46	6
"	"	15	0.99	127

Mean percentage damage 0.71%

Maize	"	11	22.00	2
"	"	12	14.90	7
"	"	13	0.70	5
"	"	15	8.80	35
"	"	17	10.50	34

Mean percentage damage 9.84%

The following pests were observed during the analysis of the samples.

1. Lesser grain borer
2. Rust red flour beetle
3. Rice weevil
4. Saw toothed grain beetle
5. Rice moth
6. Fig Moth
7. Angunmois grain moth.

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TABLE NO.2.

Statement showing the coefficient of correlation between period of storage and damage of food grains.

Name of the Crop.	Coef. of co-rrrelation 'R' value.	Coef. of regression 'b' value.	Significant at 5%	Remarks
Bajri	0.775	0.68	**	Highly significant
Jowar	0.664	0.49	**	"
Wheat	0.679	0.23	**	"
Paddy	0.561	0.05	N.S.	Non-Significant.

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TABLE NO. 3

Statement showing different modes of storage of grains

Name of Crop.	Bairi		Wheat		Paddy		Jowar		Mung		Math		Total	
	Wt. in Kgm.	No. of cultivators.	Wt. in Kgm.	No. of cultivators.	Wt. in Kgm.	No. of cultivators.	Wt. in Kgm.	No. of cultivators.	Wt. in Kgm.	No. of cultivators.	Wt. in Kgm.	No. of cultivators.	Wt. in Kgm.	No. of cultivators.
Gunny bag.	120205 (12.90)	122 (19.24)	104209 (25.61)	155 (30.45)	1341 (0.60)	4 (1.80)	99419 (27.64)	105 (22.68)	1954 (21.53)	11 (30.56)	446 (14.60)	1 (9.09)	322774 (19.99)	404 (21.42)
Earthen Jar	409033 (64.01)	395 (61.24)	198317 (48.44)	231 (45.32)	115922 (51.59)	130 (52.56)	187059 (52.01)	232 (50.11)	7120 (72.47)	25 (69.44)	2608 (85.40)	10 (90.91)	920066 (55.93)	1023 (54.24)
Tin Jar	16093 (2.51)	24 (3.72)	34518 (8.43)	58 (11.40)	32105 (14.29)	28 (12.61)	46768 (13.00)	64 (13.22)	-	-	-	-	129430 (7.87)	174 (9.23)
Wooden bins	32922 (5.16)	27 (4.19)	39215 (9.52)	36 (7.07)	42020 (18.70)	26 (11.72)	3959 (1.10)	11 (2.32)	-	-	-	-	112176 (7.12)	100 (5.30)
Falas	-	-	1232 (0.30)	2 (0.39)	12037 (9.21)	12 (5.40)	870 (0.24)	2 (0.43)	-	-	-	-	24139 (1.46)	16 (0.25)
Heaps	744 (0.12)	1 (0.16)	3999 (0.97)	2 (0.39)	-	-	-	-	-	-	-	-	4743 (0.22)	3 (0.16)
Pit	-	-	3400 (0.83)	4 (0.79)	-	-	-	-	-	-	-	-	3400 (0.21)	4 (0.21)
Bamboo jar	-	-	-	-	4900 (2.12)	7 (3.15)	8060 (2.32)	15 (3.24)	-	-	-	-	13400 (0.22)	22 (1.17)
Not reported	59433 (9.30)	70 (10.25)	23943 (5.24)	21 (4.13)	6372 (2.83)	15 (6.76)	13012 (3.63)	34 (7.34)	-	-	-	-	102766 (6.24)	140 (7.42)
Total:-	638036 (100)	645 (100)	409433 (100)	509 (100)	224704 (100)	222 (100)	35953 (100)	463 (100)	9074 (100)	36 (100)	3054 (100)	11 (100)	164454 (100)	1226 (100)

(N.B.- Figures in the bracket indicate percentage).

TABLE NO. 4

Statement showing percentage of stored grains affected by various Pests individually and jointly.

Name of pest observed.	No. of samples affected and percentage samples affected.																		
	Rajri		Wheat		Paddy		Rice		Jowar		Cereals		Munr		Math		Pulses		
	Total sample	%	Total sample	%	Total sample	%	Total sample	%	Total sample	%	Total sample	%	Total sample	%	Total sample	%	Total sample	%	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Lesser Grain Borer	426	37.76	290	26.73	123	47.67	34	21.38	230	33.43	1103	33.19	-	-	-	-	-	-	-
2. Rust Red Flour Beetle	8	0.71	7	0.64	1	0.39	1	0.63	4	0.58	21	0.63	-	-	-	-	-	-	-
3. Rice Weevil Moth	9	0.80	15	1.38	2	0.77	4	2.51	23	3.34	53	1.60	-	-	-	-	-	-	-
4. L.G.B., R.R.F.B.	194	17.20	118	0.88	15	5.81	40	25.16	66	9.59	433	13.06	-	-	-	-	-	-	-
5. L.G.B., R.R.F.B., R.W.M.	33	2.92	34	3.13	-	-	14	8.81	58	8.43	139	4.20	-	-	-	-	-	-	-
6. L.G.B., R.W.M.	39	3.46	81	7.47	10	3.88	12	7.55	67	9.74	209	6.31	-	-	-	-	-	-	-
7. L.G.B., Saw Toothed Grain Beetle.	9	0.80	-	-	-	-	-	-	1	0.15	10	0.30	-	-	-	-	-	-	-
8. R.R.F.B., R.W.M.	1	0.09	3	0.28	1	0.39	-	-	1	0.15	6	0.18	-	-	-	-	-	-	-
9. Pulse Beetle	-	-	-	-	-	-	-	-	-	-	-	-	67	94.37	24	100.0	91	95.79	-
10. L.G.B., R.R.F.B., S.T.G.B., R.W.M.	6	0.53	-	-	-	-	-	-	-	-	6	0.18	-	-	-	-	-	-	-
11. L.G.B., Flea Beetle	1	0.09	-	-	-	-	-	-	3	0.44	4	0.12	-	-	-	-	-	-	-
12. L.G.B., R.R.F.B., Flea Beetle	2	0.18	-	-	-	-	4	2.51	-	-	6	0.18	-	-	-	-	-	-	-
13. L.G.B., R.R.F.B., R.W.M., Flea Beetle	2	0.18	-	-	-	-	-	-	-	-	2	0.06	-	-	-	-	-	-	-
14. L.G.B., R.W.M., Flea Beetle	2	0.18	-	-	-	-	-	-	-	-	2	0.06	-	-	-	-	-	-	-
15. R.W.M., R.R.F.B., S.T.G.B.	-	-	14	1.29	1	0.39	27	16.98	26	3.78	68	2.06	-	-	-	-	-	-	-
16. L.G.B., Annapolis Grain Moth R.R.F.B.	6	0.53	8	0.74	6	2.33	-	-	4	0.58	24	0.72	-	-	-	-	-	-	-
17. L.G.B., A.G.M., R.R.F.B.	3	0.26	-	-	-	-	-	-	5	0.72	8	0.24	-	-	-	-	-	-	-
18. Fig Moth, L.G.B., R.R.F.B., R.W.M.	16	1.42	1	0.09	3	1.16	1	0.63	26	3.78	47	1.43	-	-	-	-	-	-	-
19. With out pest	371	32.89	514	47.37	96	37.21	22	13.84	174	25.29	1177	35.48	4	5.63	-	-	4	4.21	-
TOTAL:-	1128	100%	1085	100%	258	100%	159	100%	688	100%	3318	100%	71	100%	24	100%	95	100%	-

Notes:- (1) L.G.B. = Lesser Grain Borer (2) R.R.F.B. = Rust Red Flour Beetle (3) R.W.M. = Rice Weevil Moth (4) S.T.G.B. = Saw Toothed Grain Beetle

(5) A.G.M. = Annapolis Grain Moth.

Table 10.5

Statement showing different types of pesticides or preservatives adopted by cultivators for storing grains in Gujarat State, quantity of grains for which different preservatives are used and No. of cultivators who use them.

Sr. No.	Name of crop.	Bajri		Wheat		Rice or Paddy		Jowar		Mung		Math		Total	
		Wt. in Kgm.	No. of Cultivators.	Wt. in Kgm.	No. of Cultivators.	Wt. in Kgm.	No. of Cultivators.	Wt. in Kgm.	No. of Cultivators.	Wt. in Kgm.	No. of Cultivators.	Wt. in Kgm.	No. of Cultivators.	Wt. in Kgm.	No. of Cultivators.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	Ash	200170 (31.32)	168 (26.05)	50989 (12.45)	56 (11.0)	2626 (1.17)	15 (6.76)	31359 (8.72)	48 (10.37)	4318 (47.59)	7 (19.44)	709 (23.22)	2 (12.12)	250171 (17.64)	296 (15.65)
2.	Salt	1244 (0.19)	2 (0.31)	186 (0.65)	1 (0.20)	9330 (4.15)	3 (1.35)	-	-	-	-	-	-	10760 (0.65)	6 (0.33)
3.	B.H.C.	39266 (5.14)	35 (5.23)	51074 (12.47)	49 (9.63)	3702 (1.65)	3 (1.35)	23997 (6.67)	27 (5.83)	-	-	-	-	118039 (7.12)	114 (6.04)
4.	Neem Leaves	6359 (1.00)	10 (1.55)	809 (0.20)	2 (0.39)	31168 (13.87)	21 (9.46)	7722 (2.15)	15 (3.24)	149 (1.64)	1 (2.77)	-	-	46213 (2.21)	49 (2.61)
5.	D.D.T.	1116 (0.17)	1 (0.15)	-	-	-	-	-	-	-	-	-	-	1116 (0.07)	1 (0.05)
6.	Kitox powder	4000 (0.63)	3 (0.46)	2317 (0.57)	3 (0.59)	6900 (3.07)	8 (3.60)	2042 (0.57)	2 (0.43)	-	-	-	-	15259 (0.93)	16 (0.25)
7.	Tobacco leaves	-	-	781 (0.19)	2 (0.32)	260 (0.12)	2 (0.90)	3635 (1.01)	5 (1.08)	-	-	-	-	4676 (0.22)	9 (0.49)
8.	Sand	335 (0.05)	1 (0.15)	3794 (0.93)	3 (0.52)	-	-	-	-	346 (3.21)	3 (8.34)	-	-	4475 (0.27)	7 (0.37)
9.	Mercury	-	-	2000 (0.49)	2 (0.39)	1075 (0.48)	1 (0.45)	2800 (0.78)	2 (0.43)	-	-	-	-	5875 (0.36)	5 (0.26)
10.	Boric powder	-	-	9492 (2.32)	16 (3.14)	5655 (2.52)	5 (2.25)	19658 (5.46)	20 (4.32)	-	-	-	-	34811 (2.12)	41 (2.17)
11.	Washing Soda	-	-	-	-	-	-	500 (0.14)	2 (0.43)	-	-	-	-	500 (0.03)	2 (0.10)
12.	Castor Oil	400 (0.06)	1 (0.12)	13982 (3.42)	26 (5.11)	16720 (7.47)	10 (4.50)	-	-	-	-	-	-	31162 (1.29)	37 (1.97)
13.	Agrosan	-	-	670 (0.16)	1 (0.20)	-	-	-	-	-	-	-	-	670 (0.04)	1 (0.05)
14.	Tamarind Leaves	-	-	-	-	5000 (2.22)	3 (1.35)	-	-	-	-	-	-	5000 (0.30)	3 (0.12)
15.	Ash & Neem Leaves	52669 (9.12)	60 (9.30)	2461 (0.60)	6 (1.12)	8275 (3.62)	12 (8.12)	24914 (6.93)	40 (8.64)	-	-	-	-	84319 (5.73)	124 (6.57)
16.	Salt and Neem Leaves	200 (0.03)	1 (0.15)	372 (0.09)	1 (0.20)	1700 (0.76)	2 (0.90)	930 (0.26)	1 (0.22)	-	-	-	-	3202 (0.19)	5 (0.22)

contd.....2

(i.e., figures in the bracket indicate percentage)

TABLE NO. 4

Statement showing percentage of stored grains affected by various Pests individually and jointly.

No. of samples affected and percentage samples affected.

	Jowar	Cereals		Mung	Math	Pulses
		Total	% Total sample			
						10

TABLE NO. 5 Contd...

1	2	3	4	5	6	7	8	9						
17. Camphor and Neem Leaves.	100 (0.02)	1 (0.16)	-	-	400 (0.12)	1 (0.45)	-	500 (0.03)	2 (0.10)					
18. Ash Tobacco Leaves and neem Leaves.	-	-	15578 (3.80)	27 (5.30)	2700 (1.20)	2 (0.90)	-	18278 (1.11)	29 (1.55)					
19. Ash & Mercury	1420 (0.22)	1 (0.15)	-	-	-	-	-	1420 (0.09)	1 (0.05)					
20. Ash & Sand	4762 (0.75)	6 (0.83)	3274 (0.95)	5 (0.98)	-	600 (0.17)	2 (0.43)	9236 (0.56)	13 (0.69)					
21. Ash & B.H.C.	2125 (0.34)	2 (0.31)	-	-	-	112 (0.03)	1 (0.22)	2237 (0.14)	3 (0.16)					
22. Castor oil & boric powder.	-	-	-	-	-	-	-	-	-					
23. Coconut & Neem Leaves.	-	-	-	-	6510 (2.89)	4 (1.80)	-	6510 (0.40)	4 (0.21)					
24. Ash & Tobacco Leaves.	2360 (0.37)	7 (1.09)	-	-	-	-	-	2360 (0.14)	7 (0.37)					
25. Ash & Kitor	4300 (0.67)	7 (1.09)	-	-	-	-	-	4300 (0.26)	7 (0.37)					
26. Lime	-	-	-	-	-	758 (0.21)	1 (0.22)	758 (0.05)	1 (0.05)					
27. Castor oil & boric powder.	-	-	-	-	-	8390 (2.33)	5 (1.08)	8390 (0.51)	5 (0.26)					
28. Without any preservatives.	312210 (48.86)	339 (52.56)	251042 (61.31)	309 (60.71)	122623 (54.57)	124 (55.86)	232230 (64.57)	292 (63.06)	4261 (46.96)	25 (69.45)	2345 (76.78)	9 (21.82)	924711 (56.22)	1092 (52.22)
Total:-	639036 (100%)	645 (100%)	409433 (100%)	509 (100%)	224704 (100%)	222 (100%)	359653 (100%)	463 (100%)	9074 (100%)	36 (100%)	3054 (100%)	11 (100%)	1644954 (100%)	1886 (100%)

(FIGURES IN BRACKET INDICATE PERCENTAGE)

Table NO.6

Statement showing percentage grains stored for seed, sale and family use, of the total production.

Sr. No.	Use	Sajri		Wheat		Paddy		Jowar		Total cereals.	Average cereals.	Mung		Math		Total pulses.	Average pulses.		
		Wt.in Kgm.	%	Wt.in Kgm.	%	Wt.in Kgm.	%	Wt.in Kgm.	%	Wt.in Kgm.	Wt.in Kgm.	%	Wt.in Kgm.	%	Wt.in Kgm.	%	Wt.in Kgm.	Wt.in Kgm.	
1.	Seed	43204	4.92	62060	11.19	15324	5.60	31090	7.06	151678	37920	7.06	1176	5.17	409	8.46	1645	823	5.83
2.	Sale	239359	27.28	145338	26.20	72322	26.41	39831	18.13	536250	134213	25.01	14162	62.25	2492	44.94	16654	8327	58.85
3.	Family	591041	67.80	347373	62.61	186168	67.99	329442	74.81	1457824	364456	67.93	7413	32.58	2524	46.60	9997	4099	35.35
Total:-		277404	100%	554771	100%	273914	100%	440363	100%	2146352	536589	100%	22751	100%	3345	100%	28296	14149	100%