



Pre-Harvest Losses as Perceived by the Wheat Growers in Madhya Pradesh– An Economic Analysis

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Abstract : The study analyzed the physical and financial losses caused by weeds, pest and diseases in cultivation of wheat in Madhya Pradesh. The relevant primary data has been collected from 160 wheat growers of two major wheat producing districts (Hoshangabad and Vidisha) of Madhya Pradesh during the year 2012 -13. The study revealed that the majority of wheat growers (79.47%) were able to distinguish the pest and disease attack by quantitative assessment. The frequency of major pest like termite, aphids and rats were found to be every year (45%), once in a two years (100%) and once in a three years (43.45%) respectively. It was also observed that the extent of pre-harvest losses over actual and normal production of wheat were directly proportional to size of farms. On an average wheat grower invested more on weedicide (Rs 740 per acre) as compared to fungicide (Rs.126 per acre). The private input dealer was found to be the most important source of seeking advice on control of pest and diseases followed by Agriculture University and TV/Radios/Newspaper.

Keywords: - Pre-harvest losses, wheat growers, economic analysis.

Introduction

The yield and quality of a crop is highly influenced by pre and post harvest Management. The farmers in most cases are ignorant of this fact which affects the productivity and quality of food grains (Maiti 2010). The estimation of crop loss due to pests and diseases is a complex subject. It is in fact, difficult to assess the loss caused by the individual pest as a particular crop may be infested by the pest complex in the farmers' field conditions. Further, extent of crop loss either physical or financial depends on the type of variety, stage of crop growth, pest population, weather conditions, occurrence of diseases *etc.* Nevertheless, the crop loss estimates have been made and updated regularly at global level. The worldwide yield loss due to various types of pest was estimated as 37.4% in rice, 28.2% in wheat, 31.2% in maize and 26.3% in soybean (Oerke 2007). At all India level, crop loss estimates due to insect pests have been provided by Dhaliwal *et al* (2010), 25% losses in rice and maize, 5% in wheat, 15% in pulses and 50% in cotton. The

crop loss has increased during post-green revolution period when compared to pre-green revolution period. The severity of pest problems has reportedly been changing with the developments in agricultural technology and modifications of agricultural practices. The damage caused by major insect-pests in various crops has also been compiled and reported by Reddy and Zehr (2004). Further, number of studies have established a strong relationship between pest infestation and yield loss in various crops in India (Nair, 1975; Dhaliwal and Arora, 1994; Nag *et.al.* 2000, Solanki *et al*, 2011). To estimate the crop loss, most of the existing studies have adopted experimental treatment approach (with or without pest attack through artificial infestation) or fields with natural infestation wherein half of the field is protected against the pest while the other half is not. But, the results obtained from artificial infestation or natural infestation in the selected plots/fields will not be appropriate for extrapolation over a geographical area (Groote 2002). It is for the reason that the estimated crop losses under these conditions may not represent the actual field conditions of

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farmers. Alternatively, the estimates collected directly from the farmers through sample survey may be reliable and could be used for extrapolation in similar geographical settings. However, the farmers' estimates are likely to be subjective and these should be validated with expert estimates of the state department of agriculture. Hence the present study has been formulated to estimate the physical and financial losses caused by pests and diseases and examine the measures of

pest and disease management to reduce the crop loss due to pests and diseases at farm level.

Methodology

Wheat crop has been considered for assessment of pre-harvest losses in Madhya Pradesh as MP is one of the major wheat producing states having second largest area under the crop in India (Table 1).

Table 1. Area, Production and yield of major wheat producing states in India

Districts	Area (million ha)	% to India	Production (million tonnes)	% to India	Yield (kg ha ⁻¹)	%age change to India
Uttar Pradesh	9.64	33.16	30	34.53	3112	4.15
Punjab	3.51	12.07	16.47	18.96	4692	57.03
Haryana	2.52	8.67	11.63	13.39	4615	54.45
Madhya Pradesh	4.34	14.93	7.63	8.78	1758	-41.16
Rajasthan	2.48	8.53	7.21	8.30	2907	-2.71
Bihar	2.1	7.22	4.1	4.72	1952	-34.67
Gujarat	1.27	4.37	4.02	4.63	3165	5.92
Maharashtra	1.31	4.51	2.3	2.65	1756	-41.23
Other	1.91	6.57	3.51	4.04	1726	-42.23
India	29.07	100.00	86.87	100.00	2988	

The primary data were collected from the selected respondents of the area through personal interview. A multistage sampling technique has been used for selection of respondents of the area under study. At the first stage Hoshangabad and Vidisha districts from Central Narmada Valley and Vindhyan Plateau agro-climatic regions

respectively, were purposively selected for the study as these were found to be true representative for cultivation of wheat in M.P. Further, 3 villages near by the regulated market (in radius of 10 KM) and 3 villages far away from the regulated market (>10 Km from regulated market) have been selected for the study in second stage (Table 2).

Table 2. Selected Districts and villages for the study

Agro -climatic Regions	Selected districts	Selected villages	
		In radius of 10 km	> 10 km
Central Narmada Valley	Hoshangabad	Bekour	Pipariya Chhatrsal
		Bagalkhedi	Mahua kheda
		Samakeshli	Baskhapa
		Mirzapur	Adampur
Vindhyan Plateau	Vidisha	Rangai	Bhatni
		Davar	Bhairowkhedi

In third stage a list of all the farmers of the selected village has been prepared and classified in marginal (below 2 acre), small (2- 4 acre), medium (4-10 acre) and large (above 10 acre) categories according to their size of operational holdings and 20 farmers were selected randomly in each category for the study. Hence, total sample size is of 160 farmers of two major wheat-producing district of Madhya Pradesh.

The collected data has been classified, tabulated and analyzed by using suitable statistical tools and statistical package of social science (SPSS). The qualitative as well as quantitative losses as perceived by selected wheat growers were recorded for the study. The losses were also analyzed on normal production (without attack of disease and pest) and actual production (with attack of disease and pest) of wheat in the area under study.

Table 3. Identification of pests and disease attack

Description		%age of HHs
HHs able to distinguish pests and disease attack		94.38
Assessment about the severity of the attack	Quantitative assessment	5.96
	Qualitative assessment	79.47
	Both	14.57

Incidence of Pre Harvest Losses

The attack of major pest *i.e.* aphids (48.13%), termite (65.00%) and rat (44.38%) respectively was not so important in cultivation of wheat and the frequency of attack of aphid, termite and rat was found in every season (100%). The attack of termite and rat was found once in two seasons (45.0%) and once in three seasons (43.75%) respectively in the area. The majority of house holds also reported the production losses by aphid (86.25%), termite (94.38%) and rat (88.75%) respectively was found to be below 5% in cultivation of wheat.

Results and Discussion

The incidence and magnitude of crop loss due to pests, disease and weed infestation, Cost of Chemical methods adopted by wheat growers of different size of farms to control pests and diseases and extension services perceived by them on pests and disease control management were studied.

Identification of pests and disease attack

The majority of wheat growers (94.38%) of the area were able to distinguish pest and diseases attack in wheat. Out of them 79.47 %house holds able to distinguish pest and disease attack by qualitative assessment, while only 5.96% of HHs able to assessed the pest and disease attack by quantitative assessment in wheat. (Table 3).

As regards to rank of severity of major diseases of wheat; rust, smut and leaf blight were found to be major diseases of wheat in the area. The majority of HHs reported that these were found to be of least important in the area. The 78.13 %HHs also reported that the frequency of rust attack was found to be once in two seasons followed by every year (16.88%) and once in three years (5%). About 46.25 %HHs reported that the attack of leaf blight was found to be once in three seasons followed by once in two seasons (41.25%) and every season (12.50%) in cultivation of wheat.

Table 4. Incidence of pre-harvest losses (percentage of households)

Name of the pest/disease/weed	Rank of severity*			Frequency of attack**			Production loss***				
	1	2	3	1	2	3	1	2	3	4	5
Major pests											
Aphid	20.00	32.00	48.13	100.00	-	-	86.25	13.75	0.00	0.00	0.00
Termite	15.00	20.00	65.00	37.50	45.00	17.50	94.38	5.63	0.00	0.00	0.00
Rat	16.88	38.75	44.38	19.38	36.88	43.75	88.75	6.88	4.38	0.00	0.00
Major diseases											
Rust	0.00	8.13	91.88	16.88	78.13	5.00	97.50	1.88	0.63	0.00	0.00
SMUT	0.00	0.00	100.00	36.25	43.75	20.00	88.13	11.88	0.00	0.00	0.00
Leaf blight	0.00	0.00	100.00	12.50	41.25	46.25	95.00	3.13	1.88	0.00	0.00
Major weeds											
<i>Phalaris minor</i>	1.88	11.88	86.25	100.00	0.00	0.00	91.25	8.75	0.00	0.00	0.00
Broad leaf weeds (NutGrass, Field bind weed, Garden spurge, Asthma- plant, Chitchita etc.)	0.00	19.38	80.63	100.00	0.00	0.00	95.00	5.00	0.00	0.00	0.00

Note: * very important=1; important=2; not important=3 ** Every season=1; once in two seasons=2; once in three seasons=3 *** <5%=1; 5-10%=2; 10-25%=3; 25-50%=4; >50%=5

The production losses occurred from these diseases was found to be less than 5% from the attack of rust (97.50%), smut (88.13%) and leaf blight (95.00%). *Phalaris minor*, and broad leaf weeds *i.e.* NutGrass, Field bind weed, Garden spurge, Asthma-plant, Chitchita etc. were found to be the major weeds of wheat but their severity was not so important as reported by 80% HHs. Their frequency of attack was found in every season but the production losses were

found to be below 5% as reported by the majority (95.00%) of HHs (Table 4).

The magnitude of crop loss

The magnitude of crop losses due to pest, diseases and weeds infestation was also observed (Table 5). It is observed from the data that on an average size of farm, the 8.89% and 9.75% losses were recorded over normal (34.27q ha⁻¹) and actual (31.22 q ha⁻¹) production respectively.

Table 5. Magnitude of crop loss in wheat in different size of farms

(q/ha)

Description	Size of farms				Overall
	Marginal	Small	Medium (q ha ⁻¹)	Large	
Actual production with attack	32.70	32.11	36.61	23.47	31.22
Normal production without attack	35.12	34.88	39.92	27.15	34.27
Loss of output	2.42	2.77	3.31	3.68	3.04
Monetary loss (Rs ha ⁻¹)	3025.75	3458.00	4137.25	4600.38	3805.34
Percentage loss over actual production	7.40	8.62	9.04	15.68	9.75
Percentage loss over normal production	6.89	7.93	8.29	13.56	8.89

The percentage of losses over actual and normal production were found to be increasing from 6.89% in marginal to 13.56% in large size of farms over actual production and from 7.40% in marginal to 15.68% in large farms over normal production of wheat. Due to this a loss of Rs 3805.34 /ha was incurred to an average wheat grower and this loss was also found to be increasing with the size of farm from Rs 3025.75 ha⁻¹ in marginal to Rs 4600.38 ha⁻¹ in large farms.

Cost of Chemical

It is observed that to control weeds in cultivation of wheat, an average wheat grower invested Rs 740.01 ha⁻¹ in weedicide. Amongst different size of farms cost of weedicide was found to be the highest at medium size of farm (Rs

758.91 /ha) followed by large (Rs 757.23/ha), small (Rs 746.19 /ha), and marginal (Rs 697.70/ha). Generally hand-weeding was found in practice to control weeds in wheat, as wheat is a winter season crop and infestation of weeds not a burning problem. *Phalaris minor* was found to be one of the common weeds of the wheat in the study area, which seems like wheat. Hence, hand weeding is the only solution to solve the problem. As regards to cost of fungicides, an average HH invested Rs 126.80/ha as seed – treatment with fungicides *viz.* Bavistin, Thairum and Carbandazim *etc.* in the study area. As the size of farm increases the cost of fungicides was found to be increasing from marginal (Rs 77.66/ha) to large (Rs 182.48/ha) size of farms. None of the farmer was found to be used pesticide to control aphids, rate and termites in the area under study.

Table 6. Cost of chemical adopted in wheat to control pre-harvest losses

Particulars	Marginal	Small	Medium (q ha ⁻¹)	Large	Total
% HH adopted control measures	22.50	27.50	37.50	50.00	34.38
Weedicide					
No of sprays acre ⁻¹	1.0	1.0	1.0	1.0	1.0
Cost of chemicals	528.95	581.78	608.86	617.25	584.21
Labour charges	168.75	164.40	150.05	139.97	155.80
Total Cost	697.70	746.19	758.91	757.23	740.01
Fungicide					
No. of sprays acre ⁻¹	1.0	1.0	1.0	1.0	1.0
Cost of chemicals	62.34	83.14	119.92	149.14	103.64
Labour charges	15.31	20.20	23.79	33.35	23.16
Total Cost	77.66	103.34	143.70	182.48	126.80

Sources of extension services regarding plant protection measures

Sources of extension services regarding plant protection measure were observed and ranked them as most important, important and least important as per the farmer's perception (Table 7). It is observed from the data that 26.25% HHs were seeking advice related to control of pest and disease in wheat. Private input dealers were found to be most important source for giving advice on pest and disease control as reported by 64.29% of HHs followed by

agricultural university/ KVKs (7.14%) and TV/Radio service/News paper (4.76%), It is also observed that fellow farmers were found to be least important for seeking advice to control on pest and disease.

Hence, it can be concluded that private input dealers were found to be most important whereas, govt. extension agent and fellow farmers were found to be important and least important extension services on pest and disease control as reported by majority of HHs of study area.

Table 7. Extension services on pests and disease control

Particulars	%age of HHs		
Percentage of HHs seeking advice	26.25		
Sources of Information			
Sources of advice	Most imp sources	Important sources	Least important sources
Government extension agent	0.00	76.19	23.81
Private input dealer	64.29	21.43	14.29
Fellow farmers	0.00	0.00	100.00
TV/Radio service/Newspaper	4.76	16.67	78.57
Agricultural University/KVK	7.14	19.05	73.81
Any other	0.00	0.00	0.00

Thus it is clear from the above result that incidence of weeds, insect pest and diseases was found not so problematic in Madhya Pradesh. The majority of wheat growers are able distinguish the attack of pest and diseases by qualitative assessment. On an average loss of 8.89% and 9.75% over normal (34.27 q ha⁻¹) and actual (31.22 q ha⁻¹) production. Termites, aphids and rats were found to be major insect - pest of wheat. *Phalaris minor* was reported as noxious weed in the area under study. Wheat growers used Bavistin/ Thairum / Carbendazim to control diseases like rust, smut and leaf blight of wheat. Insect pest were not found so severe in cultivation of wheat. As for as sources of extension information are concerned private input dealers were found to be most important source of seeking advice on plant protection measures.

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