

# PROTECTIVE CLOTHING FOR THE WORKERS HARVESTING WHEAT - AN ASSESSMENT IN PUNJAB STATE

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**Abstract:** Agriculture, with its allied sectors, is unquestionably the largest livelihood provider in India, more so in the vast rural areas. There are numerous problems for the workers particularly during harvesting of the cereal crops. To tackle with these problems, protective clothing was developed for the workers harvesting wheat. It is expected that the use of protective clothing will reduce their exposure to wheat husk (dust). According to the problems faced by the workers harvesting wheat, four protective garments (beak shaped mask, cap with mask, hood mask and scarf mask) were designed and developed to protect them from the health hazards. The level of acceptability and satisfaction of the functional features of these four protective garments were assessed separately. The respondents were satisfied with the functional features of beak shaped mask. All the respondents (100%) were highly satisfied with the protection, the cap with mask provided to them. Beak shaped mask, cap with mask, and scarf mask were developed and stitched using fine cotton fabric, whereas hood mask was designed and stitched using knitted cotton. The hood mask was not accepted by the respondents even for the trial purpose because it was uncomfortable due to the hot weather conditions prevailing in the state. All the respondents (100%) were highly satisfied with all the attributes of the scarf mask.

**Keywords:** dust, harvesting, protective garments, wheat

## Introduction

India is the second largest wheat producer and produces twelve per cent of the world production (Mishra P & Parija P, 2013). The Punjab state is the major contributor to national food production and food grain reserves. The state has been ranked 1st in agriculture, infrastructure, and consumer markets, 5<sup>th</sup>

in macro economy, 7<sup>th</sup> in primary health services and 10<sup>th</sup> in primary education and industrial investments (Sharma et al, 2011). The state economy is predominantly an agrarian economy and it is popularly known as the wheat basket of India. The state contributes a considerable share in national food grain production and thereby aids in ensuring the national food security. Major crops grown in the state include wheat, paddy and sugarcane.

Wheat (*Triticum aestivum L*) is the second most important food crop in India after rice, both in terms of area and production. The increase in production of cereals is due to the adoption of recommended agricultural practices. Indian farm worker, both men and women are involved in wheat harvesting. Presently the major problems of the workers harvesting wheat are the direct exposure to dust that is created in the microclimate during harvesting, which leads to tremendous breathing and lung problems. They use cloth, handkerchief, etc to cover their nose and mouth to protect from wheat husk (dust). To combat with these problems, a study was undertaken to develop special protective clothing for the workers harvesting wheat to protect them from inhaling dust and to further analyse the acceptability of the same in three districts of Punjab.

## Objectives

(i) To develop protective clothing for workers harvesting wheat. (ii) To analyze the acceptability of the prepared protective clothing.

## Methodology

According to the problems faced by the workers harvesting wheat, four protective garments were designed to protect them from the health hazards. The designed garments included beak shaped mask, cap with mask, hood mask and scarf mask. Beak shaped mask, cap with mask, and scarf mask were developed and stitched using fine cotton fabric,

whereas hood mask was designed and stitched using knitted cotton. The acceptability of the designed protective garments was evaluated on the selected workers harvesting wheat.

The study was conducted in three districts of Punjab. A sample of one hundred and twenty respondents, forty from each district was selected to get the required information. These districts of Punjab included Ludhiana, Moga and Ferozepur. The selection of the sample was done purposively. The workers harvesting wheat were personally contacted and requested to wear the designed protective clothing while harvesting for a period of one month. They were asked to provide unbiased and independent opinions regarding the desired information needed for this study. After a period of one month the respondents were contacted personally to get the required information about the acceptability of the designed protective clothing. The data was tabulated and analyzed by giving scores and ranks to find the most suitable feature of the different protective garments. The basis of scoring and ranking has been described as under:

Suitability of every functional feature incorporated in a garment/accessory was assessed on 3 point continuum scale i.e. Highly Satisfied (H.S.), Satisfied (S.) and Not Satisfied (N.S.) & was given weightage 3, 2, 1 respectively. The frequency was multiplied with weightage. The scores were added and then were divided with number of respondents (N). WMS of all the characteristics of garments were added and then were divided by the number of characteristics. Any functional feature having WMS between 1-1.66 was rated as Not Satisfied, 1.67-2.33 was rated as Satisfied and scoring 2.34-3.00 was rated as Highly Satisfied. The garment scoring maximum WMS was given first rank, where as the garment scoring least WMS was given last rank.

## Results

Satisfaction level and acceptability of functional features of four protective garments including beak shaped mask, cap with mask, hood mask and scarf mask were assessed separately.

### Beak shaped mask

The investigator studied the satisfaction level from functional features of beak shaped mask. Table 1 shows that the first rank was assigned to the ease of wearing and removal of beak shaped mask, comfort in breathing of the cotton fabric, comfort during wear of the elastic at the sides of the mask with weighted mean score of 3.00. These attributes were found to be

highly satisfied by all the respondents. The protection from wheat husk (dust) penetration was given the fifth rank with weighted mean score of 1.90. Majority of the respondents were satisfied with these aspects of beak mask. Please refer Table 1.

### Cap with mask

The figures in table 2 illustrate that all the respondents were highly satisfied with the protection the cap provided to their head from the sun, the ease of wearing and removal of the mask and the comfort of the studs at the sides of the mask to attach it to the cap. All these four attributes were given rank I by all the respondents with the weighted mean score of 3.00. Please refer Table 2.

The fifth rank was allocated to the comfort that the respondents received from the overall size and shape of the mask with weighted mean score of 2.87, followed by the satisfaction from the height of the mask with weighted mean score of 2.77 and with rank VII, protection from wheat husk (dust) penetration from the mask of fine cotton fabric with weighted mean score of 2.73 and with rank VIII. The satisfaction derived from the width of the mask was given the last rank with weighted mean score of 2.60. It is also evident from this table that the respondents were highly satisfied with all the features of the cap with mask.

### Hood mask

The hood mask was not accepted by the respondents even for the trial purpose because it seemed to be uncomfortable for them to wear due to the hot weather conditions in Punjab.

### Scarf mask

The data in table 3 shows the satisfaction derived by the respondents from the scarf mask. It can be elicited from the table that out of thirteen, nine attributes of the scarf mask i.e. protection of head and neck from wheat husk (dust) penetration from the head cover of double layered voile fabric, protection from wheat husk (dust) penetration from the mask of double layered voile fabric, comfort of the elastic at nose portion in the mask, comfort of the elastic at the forehead, height of the mask, width of the mask, ease of tying knot of the strap, ease of wearing and removal of the scarf mask got the first rank with weighted mean score of 3.00. Please see table 3.

The tenth rank was given to the satisfaction which the respondents derived from the size of the head cover with weighted mean score of 2.97, followed by ease of opening the knot of the strap which ranked XI with weighted mean score of 2.90, satisfaction achieved from the width of the elastic at the forehead with

**Table1. Distribution of respondents according to their satisfaction level for the features of beak shaped mask**

n=120

Characteristics	Frequency distribution									Weighted score			W.M.S.	Rank
	Highly satisfied			Satisfied			Some what satisfied							
	L	M	F	L	M	F	L	M	F	L	M	F		
<b>Beak shaped mask</b>														
Protects from wheat husk (dust) penetration	-	-	-	40 40x2	36 36x2	32 32x2	-	4 4x1	8 8x1	80	76	72	1.90	V
Easy to wear	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
Easy to remove	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
<b>Cotton fabric</b>														
Comfortable for breathing	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
<b>Elastic at sides of mask</b>														
Comfortable during wear	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I

(L- Ludhiana, M- Moga, F- Ferozepur)

**Table 2. Distribution of respondents according to their satisfaction level for the features of cap with mask**

n = 120

Characteristics	Frequency distribution									Weighted score			WM S	Rank
	Highly satisfied			Satisfied			Some what satisfied			L	M	F		
	L	M	F	L	M	F	L	M	F				L	M
<b>Cap</b>														
Protects head from sun	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
<b>Mask of fine cotton fabric</b>														
Protects from wheat husk (dust) penetration	32 32x3	32 32x3	32 32x3	4 4x2	4 4x2	8 8x2	4 4x1	4 4x1	-	108	108	112	2.73	VIII
Elastic of mask is comfortable	36 36x3	32 32x3	32 32x3	4 4x2	4 4x2	8 8x2	-	4 4x1	-	116	108	112	2.80	VI
<b>Overall shape and size of mask</b>														
Height of mask	32 32x3	28 28x3	32 32x3	8 8x2	12 12x2	8 8x2	-	-	-	112	108	112	2.77	VII
Width of mask	28 28x3	32 32x3	24 24x3	8 8x2	8 8x2	8 8x2	4 4x1	-	8 8x1	104	112	24	2.60	IX
Comfortable	32 32x3	36 36x3	36 36x3	8 8x2	4 4x2	4 4x2	-	-	-	112	116	116	2.87	V
Easy to wear	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
Easy to remove	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
<b>Studs at sides of mask to attach it to the cap</b>														
Comfortable	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I

(L- Ludhiana, M- Moga, F- Ferozpur)

**Table 3. Distribution of respondents according to their satisfaction level for the features of scarf mask**

n=120

Characteristics	Frequency distribution									Weighted score			WMS	Rank
	Highly satisfied			Satisfied			Some what satisfied							
	L	M	F	L	M	F	L	M	F	L	M	F		
<b>Head cover of double layered voile fabric</b>														
Protects head and neck from wheat husk (dust) penetration	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
<b>Mask of double layer voile fabric</b>														
Protects from wheat husk (dust) penetration	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
<b>Elastic at nose portion in the mask</b>														
Keep mask in position	32 32x3	36 36x3	28 28x3	8 8x2	4 4x2	12 12x2	-	-	-	112	116	108	2.80	XIII
Comfortable	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
<b>Elastic at forehead</b>														
Comfortable	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
Width of elastic	32 32x3	36 36x3	36 36x3	8 8x2	4 4x2	4 4x2	-	-	-	112	116	116	2.87	XII
<b>Shape of mask</b>														

Height of mask	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
Width of mask	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
<b>Size of head cover</b>														
Satisfied	36 36x3	40 40x3	40 40x3	4 4x2	-	-	-	-	-	116	120	120	2.97	X
<b>Strap for knotting</b>														
Easy to tie knot	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
Easy to open knot	40 40x3	36 36x3	32 32x3	-	4 4x2	8 8x2	-	-	-	120	116	112	2.90	XI
<b>Overall scarf mask</b>														
Easy to wear	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I
Easy to remove	40 40x3	40 40x3	40 40x3	-	-	-	-	-	-	120	120	120	3.00	I

(L- Ludhiana, M- Moga, F- Ferozepur)

weighted mean score of 2.87 and rank XII. The last rank was assigned to keeping the mask in position by the elastic at the nose portion with weighted mean score of 2.80. All the respondents were highly satisfied with all the attributes of the scarf mask.

**Conclusion**

The satisfaction level and acceptability of functional features of four designed and developed protective garments including beak shaped mask, cap with mask, hood mask and scarf mask were assessed separately. The respondents were satisfied with the functional features of beak shaped mask such as ease in donning and doffing, comfort in breathing through the cotton fabric, comfort during wear of the elastic at the sides of the mask. All the respondents were

highly satisfied with all the features of the cap with mask and scarf mask.

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