

P A R T - V

CHAPTER - 1

4. A NEW ERGONOMIC LEG-COVER FOR IMPROVEMENT
OF PADDY CULTIVATION IN INDIA.

A New Ergonomic Leg-Cover For Improvement Of Paddy
Cultivation in India.

1. Introduction

The present situation of Indian agriculture needs improvisation on non-expensive^e easy available material, improvement of work (more humanise) in the field of Indian agriculture (82). ? x

Some scattered earlier studies to improvise^e the Indian agriculture were taken. As per the present knowledge goes there are no such studies in India to protect the skin irritation, caused by working in the contaminated water logging field. There are repellent^e cream and other chemicals but none of them found suitable for the common agricultural workers, working in the field. It is reported that some fields' water become spoiled and when the workers started their work immersing legs into it, they are suffering from skin itching, inflammation and infections at hair roots (18). For this reason these fields are cultivated without full care, and sometimes are kept uncultivated. Thus productivity decreases. x

2. Aims and Objectives

This is to investigate, whether the introduction of a Polythene (durable and low cost, easy made and repairable) leg covers to protect the legs (skin eruption) immersed into the contaminated water while working in the water logging agricultural field.

3. Materials And Methods

3.1 Workers, Work and Work Place:

Five highly experienced (more than 15 years) agricultural workers in the district of Midnapur, West Bengal

coastal zone of Eastern India, drawing out the paddy seedlings, Fig.14 and transplanting them, Fig.15 in the fields in the usual way were observed.

Their physical characteristics were measured. The thermal environment of the work place was assessed, using sling psychrometer, Vernons' globe and Kata thermometer in the usual way (Sen, et al, 1966) .

3.2 Design of leg cover :

Based on the previous studies, a new low-cost, light weight polythene bottom sealed, one end open, large sock like leg-cover for the male workers was designed and developed, as would be seen in Fig.69, for this investigation. ✓

3.3 Productivity and Physiological responses :

Productivity and physiological responses such as pulse rate and oral temperature of the workers were determined in the existing conditions as well as while using the newly designed leg-cover.

3.4 Questionnaire Survey :

A questionnaire technique was used to assess the workers opinion on the development of the newly designed leg-cover.

4. Results And Discussions

4.1 Existing Methods of Work :

Sometimes workers have to do two important manual agricultural tasks: (i) to draw out the seedlings from the seed bed after suitable growth before the nodes and branching appear at the stem, Fig.14, (ii) to transplant them in bunches, Fig-15, in ankle deep to knee deep even in contaminated water.

4.2 Physical characteristics and Experiences of the workers:

The physical characteristics of the workers are given in Table-12.

4.3 Thermal Environment :

The thermal environmental data and the heat stress Index, the corrected effective temperature (basic), prevailing in the paddy fields during the study are presented in Table-19, in monsoon.

4.4 Design of leg-cover : ?

It was a large (host like) light weight, durable, low-cost ^{one end} sealed polythene made leg coverings as presented in Fig.69. It was designed considering the leg measurements of the workers, Table-12, with a large clearance, while using sweat loss would not hamper and during working into the water it would not affect the working speed as it would wrap round the leg. According to need i.e., the height of water level the Covers i.e., during working in the low level it may be folded and in the high level it would be extended as required.

The base part is suggested to be slide thick and wavy ~~like~~ and to avoid the loss [^] their footings in the slippery water logging field. ?

These system may be used after sealing a tube like polythene to the water shoes available in the market.

4.5 Work and productivity study, with and without using leg-covers :

Workers were asked to put the cover on leg and work as per their normal pace, Fig.69. The results of work,



Fig. 69

Agricultural work using leg cover.

time and productivity studies with and without using leg-cover are presented in Table-41. The working rate for drawing out seedlings was observed to be 4.33 ± 0.12 sq. meter land/worker/hour with the existing method (i.e., without using leg-cover) and 4.35 ± 0.13 with the leg cover. The work rate for transplanting was 72.93 ± 1.17 sq.meter/worker/hour with the existing method (i.e., without using leg-cover) and 72.85 ± 1.93 with the leg-cover.

Workers can use it along with an air inflated float seat as described in Part-V Chapter-1, Unit 3.

The new arrangement has similar productivity to the existing method of drawing out of seedlings and transplanting method.

4.6 Questionnaire Survey :

It is supported by cent percent positive answer and opinion, but better design should develop. The result from the questionnaire opinion survey on the new leg-cover show that its use is beneficial to protect the leg inflammations and infections caused by work in the contaminated water.

4.7 Physiological Cost :

The physiological responses of the workers are presented in Table-42. The working pulse rates were $132 \pm 9 \text{ min}^{-1}$ and $125 \pm 12 \text{ min}^{-1}$ respectively in existing drawing out seedlings and transplantation tasks where as oral temperature were $37.3 \pm 0.2 \text{ }^\circ\text{C}$ and $37.4 \pm 0.4^\circ\text{C}$ respectively. The working pulse rate using leg-cover, were $127. \pm 9.8 \text{ min}^{-1}$ and $123.7 \pm 10.6 \text{ min}^{-1}$ respectively. The work gradation with and without using leg guard is moderately heavy (Sen et al, 241).

TABLE - 41

Time and Productivity Studies During Drawingout Seedlings
and Transplanting Them, With and Without Using the Leg-Cover.

Work-method	Drawingout Seedlings (area worked m ² /person/hour)	Transplanting (area worked m ² /person/hour)
Existing method (without leg-guard)	4.33 ± 0.12 (4.15 - 4.46)	72.93 ± 1.71 (70.22-74.45)
New arrangement (with leg-guard)	4.35 ± 0.13 (4.12 - 4.42)	72.85 ± 1.93 (70.30 - 74.40)

Mean ± SD; Figures in the parentheses indicate range. n = 5.

TABLE - 42

Physiological Responses of Agricultural Workers With and Without Leg-Cover.

Tasks	At Work	
	Pulse Rate (beats/min)	Oral Temperature (°C)
Drawingout Seedlings		
Without leg-guard	132.12 \pm 9.34 (117.6 - 142.9)	37.34 \pm 0.21 (37.10 - 37.60)
With leg-guard	127.18 \pm 9.75 (115.4 - 139.5)	37.38 \pm 0.23 (37.15 - 37.65)
Transplantation		
Without leg-guard	125.35 \pm 11.82 (113.2 - 139.5)	37.38 \pm 0.37 (36.95 - 37.90)
With leg-guard	123.66 \pm 10.56 (113.2 - 136.4)	37.38 \pm 0.36 (36.90 - 37.80)

Mean \pm SD, (Figures in the parentheses indicate range), N = 5.

5. Conclusion

5.1 Benefits in the use of leg-cover :

1. Ergonomic improvement for protection the legs inflammation and infections caused by the work in spoiled water logging agricultural field, free from bad effect of chemicals which may be used for the same. X
2. Facility to work in any level of water in the field, lowering or extending the tubeparts of the guard on the leg.
3. The system may be locally made and is of low cost.

5.2 Recommendation for future in depth studies :

From the above mentioned results it can be concluded that the existing manual process of drawing out seedlings from the seed bed transplanting them may be improved by the use of low cost, may be homely made, polythene like material, light weight and easily transportable leg guard suitable for work in any level of water in the agricultural field, is beneficial to protect the leg infections and irritations with the same productivity and physiological cost. *In depth studies in design aspect should be considered.* X

6. Summary

This investigation was conducted for application of ergonomic principles to improve Indian Agriculture.

Workers have to work immersing leg sometimes in the spoiled water logging field. So they are suffering from skin itching inflammation and infections. To protect the skin of immersed portion of leg a light weight, low cost, facility to homely made, polythene like material made hose like leg cover was used. A detailed time and productivity study on a group of five highly experienced along X

with the recording of pulse rate, oral temperature etc. in a steady state condition during work, both with and without using the leg cover was carried out.

The results show apparently same productivity and physiological cost with the new arrangement of leg-cover ~~than~~^{to} in existing process, but is a subject to reduce the occupational health hazards. *