A B S T R A C T

The thesis consists of five main parts containing an ergonomics study conducted in both unorganised and organised sectors of Indian agriculture mainly of paddy cultivation in Eastern India and tea plantation in North-east India.

The present study aimed at furnishing a bench-mark data and to identify the areas where low-cost improvisation could be made, to improve occupational health and safety and to increase productivity and to humanise work.

Part I of the thesis deals with the present picture of Indian agriculture, the scope of Ergonomics in Indian agriculture, previous research work on ergonomics in India.

In Part II, the socio-economic status, nutritional conditions and occupational hazards faced by the agricultural workers in India are presented. Its Chapter I deals with the paddy cultivation and chapter 2 deals with the tea plantation workers. A questionnaire technique was used and direct observations on the workers were made. The present unorganised situations are suitable for betterment of paddy cultivation through the modifications of the existing methods and designs of implements, innovations within the capabilities of common village agriculturists, rather than total replacement of the existing tools by the newer capital intensive machines. Mechanisation in organised sector of the tea plantation is not decided by the workers but by the management.

In Part III, the evaluation of existing methods used in Indian agriculture such as, job description, workstudy and work load in relation to physiological responses of the workers engaged in respective tasks are presented. The total paddy cultivation cycle was divided into several component tasks and were observed separately in Chapter 1, whereas tea plucking task of tea plantation was dealt with in Chapter 2.

The tea leaf plucking task by the female pluckers was found to be moderately heavy with an average working pulse rate of 115.2 beats min^{-1}. The work load of paddy cultivation was observed by the male workers to vary from light to heavy categories as the average working pulse rate observed were 98.8 beats min^{-1} to 131.1 beats min^{-1} respectively out of 11 different paddy cultivation tasks observed. For female workers in paddy cultivation with observations on six tasks it was very light to heavy, as the working pulse rates observed were 95.4 beats min^{-1} to 125.6 beats min^{-1} respectively. Several tasks were found to be performed by the males only due to heavy manual work which is not preferred by the female workers. The working environment was found to be highly humid, high with solar radiations. Several recommendations from the present study as well as for ~~the~~ future ones were made.

In Part IV, the common implements and personal protective equipment used in Indian paddy cultivation were surveyed, in order to find out merits and demerits of each.

In Part V, an ergonomic evaluation of the existing methods and designs of implements for betterment of the Indian agriculture was made. Better designs of "Indigenous Plough", "Sickle", an air inflated "float-seat" and a use of a special type of leg cover were conceived, in chapter 1.

The plough was modified on the basis of the existing available designs. These modifications were: i) Use of three ergonomic handles, ii) provision of fitting a flat conical blade or one winged blade of the mould board type in a plough and iii) modifications of the dimensions of the plough according to the anthropometric measurements of Indian agricultural workers . The existing designs of sickles were modified by lowering the blade by about 3 cm or by 6 cm from the modified handle and using a round shaped guard at the edge of the handle for safety as well as for multipurpose reaping tasks.

To give facilities to the workers, to take several rest pauses during working in the water-logged muddy fields a sitting arrangement was studied using an air-inflated polythene "float-seat". The workers can work by sitting on the "float-seat" and move easily from one area of operation to the next.

To protect against the infection of the legs from the constant contact of water containing vegetable and other decomposed materials a special type of cover for the lower extremities was designed and its use was studied.

In Chapter 2, a new system of categorisation of tea-pluckers on the basis of adjusted average scores from different parameter was formulated against the existing basis of the number of shoots plucked per day as followed by the management.