



E-COFFEE TABLE BOOK

On



SAFETY GADGETS FOR AGRICULTURAL OPERATIONS



**All India Coordinated Research Project
on Ergonomics and Safety in Agriculture
ICAR-Central Institute of Agricultural Engineering,
Nabibagh, Berasia Road, Bhopal-462038**



FOREWORD

Indian Agriculture historically has grossly been using animal and human power for majority of farm operations. Due to the advancement of science in farm mechanization in the last few decades there have been substantial input of energy and power from machinery. Major percentage of the tools and equipments used by Indian farmers are manually operated, either by man or by woman.

Enhancing the performance and increasing the efficiencies of such manually operated equipments and tools the human-machine interaction, comfort and safety of operators is of paramount importance. Machine factors, human factors and lack of skill are some major cause that lead to faster fatigue, poor work performance and occasional injuries to workers. The data of agricultural accidents collected by All India Coordinated Research Project on Ergonomics and Safety in Agriculture in eight states of the country indicates about 5.5 % of total agricultural accidents are fatal and rest 94.5 % accident leads to non-fatal injuries. Many of these non-fatal injuries leads to loss of limbs and disability of different degrees, this brings social and economic difficulties to workers and their families. Safety gadgets and personal protective equipment have been developed by twelve centers of AICRP on Ergonomics and Safety in Agriculture (ESA). These are aimed to forewarn or lower the chances of agricultural accidents and subsequent injury to worker.

This e-coffee table book is a compilation of safety gadgets and safe practices and focused on creating awareness about safety gadgets. I compliment the team of scientists of AICRP on ESA for bringing out this e-coffee table book and hope that information given herein will be helpful to various stakeholders.

A handwritten signature in black ink, appearing to read 'K. Alagusundram'.

(K. Alagusundram)

January 25, 2021

PREFACE

Indian agriculture with an area of 142 million ha and annual food grain production of 280 million tonnes provides employment to more than 263 million workers. Farm machines have emerged as one of an important input in increase of production and productivity of different crops. Although tractors, power tillers, sprayers and some self-propelled equipment are manufactured in organized sector, rest manufacturing sector is in medium, small and tiny manufacturing units. Human workers are integral part of mechanization since these tools/equipment are used, operated or controlled by them. It is necessary to design agricultural tools, equipment and work places so as to suit the physical and physiological capabilities and limitations of these workers and improve their comfort and safety. Increased mechanization has also exposed these workers towards injuries at any event of agricultural accident. Many factors such as design, work arrangement, occupational skill and environmental factors involved in occurrence of any accident/injuries. Safety gadgets and personal protective equipment can avoid grievous injuries. AICRP on Ergonomics and Safety in Agriculture collected information about agricultural accidents and factors responsible for such accidents in eight states of the country. The safety gadgets have been developed to generate alarms or reduce the chances of accident occurrence. This compilation contains safety gadgets/technologies developed by centres of AICRP on ESA for different types of agricultural equipment. This includes safe tractor trailer, tractor trailer with air brakes, rear lighting system and SMV for tractor-trailers, safety gadgets for chaff cutters, PIR sensor based alert system for chaff cutter, personal protective equipment for spraying, headgear to reduce heat stress, tea leaf plucking aid, dust mask for agricultural purpose, dust proof for turmeric polisher, gloves for workers of cashew processing and fish dressing industry, etc. The compilation is aimed to create large scale awareness among different stakeholders such as planners, manufacturers, users and operators.

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January 2021

**K.N. Agrawal
Abhijit Khadatkhar
Nandini Thakur**

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SAFE TRACTOR TRAILER



Utility:

Designed to avoid accident caused by tractor trailer while transporting agricultural goods.

Features:

Hydraulic breaking system, a rear overturning protection mechanism, a side (lateral) overturning protection mechanism, and the lighting and other safety features.

Cost: Rs. 2.00 lakh

TRACTOR-TRAILER WITH AIR BRAKES



Utility:

Used in large heavy vehicles especially having a heavy load up to 20 tons.

Features:

Air compressor used to drive engine crank pulley with unlimited supply of air.

Mean time to stop: 1.02 – 8.32 s



REAR LIGHTING SYSTEM AND SMV FOR TRACTOR-TRAILERS



Utility:

Turn indicator cum brake and parking light cluster on either side are use full for enhance night visibility and safety.

Features:

Slow-moving vehicle (SMV) emblem and turn indicator is mounted on the rear door frame of the trailer for safety and visibility during night.

PERSONAL PROTECTIVE EQUIPMENT FOR MAKHANA HARVESTING



Cost: Rs. 5.00 lakh (approx.)

Utility:

Used for protecting worker from prickles/ thorns, skin diseases and occupational hazards due to unhygienic environment.

Features:

Breathing air compressor used for filling filter air in cylinder, mini diving kit (including mask, eye goggle) hose pipe, and a floating platform.

Worker can able to work for about 1 h with ease



SAFETY GADGET FOR CHAFF CUTTER



Utility:

Dry or green fodder can easily be chopped with the machine and wastage of fodder is reduced.

Features:

Safety gadgets such as flywheel lock, safety chute, warning and reversing roller used to reduce the risk of injuries.



PIR SENSOR BASED ALERT SYSTEM FOR CHAFF CUTTER



Utility:

Injuries to hands and other body parts due to chaff cutter is avoided.

Features:

PIR sensor used to sense hands of the operator and generate alert – Visible and Audio.

Use for warning the person feeling the forage in the machine.



PERSONAL PROTECTIVE EQUIPMENT



Utility:

Prevent the operator against exposure to pesticides during spraying.

Features:

Efficient spraying safety kit having pesticide arresting efficiency of about 75%.

It consists of face mask, a pair of hand gloves, an eye protector, and an apron.

Cost: Rs. 600/-

SOLAR FAN ASSISTED HEADGEAR FOR ENVIRONMENTAL HEAT STRESS



Utility:

Used to reduce the risk of heat stress and improve the comfort of farm workers during agricultural operations.

Features:

Solar powered operated fan using DC motor can reduce the head, forehead and skin temperature.



SAFETY GUARD FOR AGRICULTURAL WORKERS



Utility:

Used to avoid injuries to fingers and hands due to tea leaves chemicals.

Features:

A thumb and forefinger guard with a sharp cutting mechanism to pluck tea increases worker's efficiency.

DUST MASK FOR AGRICULTURAL WORKERS



Utility:

Used to reduce dust exposure of workers engaged in poultry and pulse industry.

Features:

Material - (raw cotton sheet+ double woven cotton+ falalin napped cloth)

Protect from airborne dust particles and should be reused after cleaning (dry or water).

DUST PROOF TURMERIC POLISHING POLISHER



Utility:

Used to reduce dust exposure of workers engaged in turmeric polishing.

Features:

waterproof cover, highly durable, very tough to tear, repairable by heat sealing, stays light in rains, easy to handle, fungus and termite resistant and UV stabilized.

Dust proof polisher, no dust around the polishing drum.

SAFETY AIDS AND WORKPLACE FOR WORKERS OF COIR INDUSTRY



Intervention with safety gadgets



Utility:

Used to reduce dust exposure of workers engaged in coir industry.

Features:

Lighting in working area and use of dust mask, gloves, eye protector, ear muffs and seat pad provided to reduce vibration.

CASHEW PROCESSING GLOVES



Utility:

Used to avoid injuries to hands due to cashewnut shell liquid oil.

Features:

Made from Pure latex (non slip grip)

Deshelling capacity: 12.66 kg/h

Scooping capacity: 8.37 kg/h

Cost: Rs. 200/-

FISH DRESSING GLOVES



Medical gloves (Inside)

Utility:

Protection from direct contact with ice cold chlorinated water.

Features:

Reduce occupation health problems in workers of fish processing occupation.

Capacity: 42.4 kg/h

Cost: Rs. 35/-



Cotton gloves (Outside)

POISONOUS GAS REMOVING PUMP FROM WELLS



Utility:

Used to minimize accidents and rescue of persons trapped in the tube-well during monsoon.

Features:

Blower type poisonous gas pumping device to remove poisonous gas from tube-well

Power Source: Tractor with 3-point hitch system



Compilation and edited by

K N Agrawal

A Khadatkhar

N Thakur

Published by

Director,

ICAR-Central Institute of Agricultural Engineering,

Nabibagh, Berasia Road, Bhopal-462038 (MP). India.

Tel. No.: 0755-2521117, 2730983; Fax: +91-755-2734016;

E-mail: director@ciae.res.in; Website: www.ciae.nic.in

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