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LIST OF ACRONYMS AND ABBREVIATION

FMRC: Farm Machinery Research Centre

SRI: System of Rice Intensification

Rs: rupees

Kgs: Kilogram

KW: Kilowatt

HP: Horse Power

Nm: Newton meter

mL: milliliter

CC: Cubic Centimeter

CHAPTER 1 INTRODUCTION

Rwanda is a mountainous country. As a result, the temperatures are generally low. Annual average temperatures range from 15 to 25 degree centigrade. Temperatures are much lower in lowlands producing areas. Low temperature is therefore a serious a biotic constraint for rice production.

Susceptibility to low temperature is most severe following late planting leading to coincidence of booting and flowering stage with extreme low temperature of May-June and November-December. Insufficient availability of water in rice fields is also a very limiting production constraint. It is very prominent in all rice production schemes where there are no dams provided, and during the dry periods in nearly (99 %) all schemes

1.1. System of rice intensification (sri)

Rice is one of the major food crops. It feeds more than 60 percent of the world's population. Food habits, market price and other related factors are encouraging people to grow rice wherever water is available. This led to pressure on water and crop producitivity resulting into increased investments on bore wells and agriculture inputs like seed, fertilizers and pesticides. These factors either indepenedently or collectively are pushing the farmers slowly into crisis.

In such situations, System of Rice Intensification (SRI) emerged as an alternative in paddy cultivation with core principles like using less seed, less water, and less fertiliser requirement. Introduced by innovative farmers in Madagascar in early 1980s, now thisis being practiced in many countries. The experiments and observations over the period revealthat there is substantial reduction in the investments on external inputs. And the productivity isusually more than the conventional rice cultivation.

Mechanical were used to control weeds.Weed removal by mechanical method is one the methods frequently used these to remove weeds from theagricultural fields. Research has been conducted on economical method s for weed removal without damaging the crops. Weeding Machine designed and developed with intent of being operated in specific crops like rice. This machine is mostly intra row weeding machines which remove weeds within multiple crop rows atonce . Weeding machines like one row walking type were developed and successfully to remove weeds from rice.

The rate and effectiveness of weed removal depends on number of parameters related to machine performanceparameters and soil properties such as types of cutting blades used, machine efficiency, moisture content, etc. Studies have been conducted on the effect of moisture content and the type of cutting blades like flat blades, spike tooth blade curved blades on the performance of weeding machines. Mechanical weeding was found to be less effective when soils has enough water during weeding operation.

2.2. What is machine design

Application of science and technology to device new improved products Product is any manufactured item including machines, furniture,too and instrument.

2.3. Ergonomics

Ergonomics is also known as human engineering or human factors engineering, the science of designing machines, products, and systems to maximize the safety, comfort, and efficiency of the people who use them. Ergonomists draw on the principles of industrial engineering, psychology, anthropometry (the science of human measurement), and biomechanics (the study of muscular activity) to adapt the design of products and workplaces to people's sizes and shapes and their physical strengths and limitations. Ergonomists also consider the speed with which humans react and how they process information, and their capacities for dealing with psychological factors, such as stress or isolation. Armed with this complete picture of how humans interact with their environment, ergonomists develop the best possible design for products and systems, ranging from the handle of a toothbrush to the flight deck of the space shuttle.

2.12. Challenges in weeding operations

Weeds are mostly removed from the field in a manual process as they are seen more as a negative factor for crop growth. The various aspects of weeding equipments consists of ergonomical considerations, it's easy working and easy handling by unskilled farmers, less damaging nature to crops, the distance between two crop rows, maximum efficiency, its important components like blades, critical design areas and the most important from all above is its cost of purchase. Every equipment which is used for weeding like hand khurpi, animal drawn blade hoe, power weeder, single-multiple row weeders etc are certainly possessing some inherent drawbacks which results in unnecessary time consumption, extra labour cost, more power requirement (manually as well as mechanically). Weeding was considered a major constraint in crop production. Most farmers experienced a serious labour bottleneck at weeding time. Extension workers considered that competition from weeds led to major losses and they estimated the yield reduction was over 10%.

CHAPTER 3 DESIGN AND CONSTRUCTIONAL DEVELOPMENT MANUAL

ROTARY PADDY WEEDER

In this chapter deals with the materials and the medology used to conduct this study of designing ratary paddy weeder

3.1. Materials selected to use

Timber: it wooden materials

Aliminum sheet is used to fabricate spike

Hammers: Like most hammers its head is hardened steel. A punch or a chisel can be driven with the flat face. Its name comes from the ball pein or rounded face. It's usually used for flattening, or peining, a rivet

Welding Shield: It is a shield (screen) used to protect eyes from spark and highly luminous sparks.

Hand Gloves: It is a thermally insulated pair of gloves used to protect hands from the excessive heat produced by the sparks and related injuries

Electrodes: It is a rod used for welding purposes. There are several types of electrode. Nonconsumable electrodes, base electrodes and coated electrodes.

Arc Welding Machine (Generator and Transformer) Both direct current and alternating current are used for arc welding, each having its particular application; in some cases either is suitable. DC welding supply is usually obtained from generators driven by electric motor or if no electricity is available, by internal combustion engine. For AC welding supply, transformers are predominantly used for almost all arc welding where mains electricity supply is available.

INOX, disc with soft grit bonding for cutting and grinding on soft metals. Contains no free iron and the aluminium oxide grit used contains very small amounts of bonded iron.

Drill machine use to drill,this machine powered by electricity.Grinding machine used to rub the uneven welding or uneven surfaces

Marker used to mark to the sheet of metals in the place you need to cut.

Caliper Tips and Tricks: Calipers, which can be Vernier, dial or digital, are versatile tools for basic length measurement. They can be used on the shop floor, in the inspection room or even in the home by hobbyists.

Balance used for measuring the weight.

CHAPTER 4 RESULTS AND DISCUSSIONS

4.1. Results

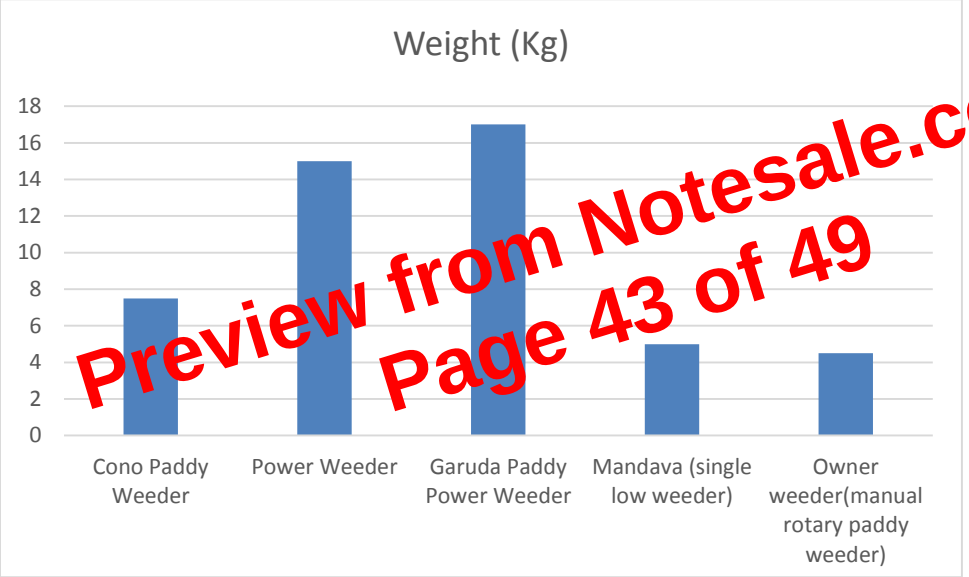
Table 1: Cost of Materials

Parts	quantity	Unit cost(frws)	total cost(frws)
frames shaft holder	2	1000	2000
frames skid holder	2	200	400
frames handle holder	2	600	1200
frames for ajusting handle	2	800	1600
metals shaft	2	300	600
rotor timber	2	1000	2000
handle timber	1	2000	2000
aliminium sheet of tickness 2.5	12	500	6000
screw M3.5	76	30	2280
bolt and nut of M6	4	300	1200
bolt and nut of M8	2	500	1000
Electrode	1	700	700
driller of M6	1	600	600
aliminium point	1	1500	1500
brush point	1	700	700

Table 2: Weight of Different Paddy Weeder

Defferent manual paddy weeder	**Weight (Kg)**
Cono Paddy Weeder	7.5
Power Weeder	15
Garuda Paddy Power Weeder	17
Mandava (single row weeder)	5
Owner weeder(manual rotary paddy weeder)	4.5

Figure 12: Comparison Weight of Manual Paddy Weeder with Owner Weeder



4.2. Discussions

Accoring to the Figure 11 of differnt price ,its show that the high consatration of price based on the buy aliminum sheet which used to fabricate the spikes,the following high price followed by the price of transport and price of frames and timber those prices show that in Rwanda all farmers can't get all that many verry easly,only for the farmers who start to spend labours cost for weeding more maney than manual rotary paddy weeder price.