



**BUSITEMA  
UNIVERSITY**  
*Pursuing Excellence*

**FACULTY OF ENGINEERING  
DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION  
ENGINEERING**

**PROJECT**



**DESIGN AND FABRICATION OF A MANUALLY OPERATED INTER-ROW  
CABBAGE WEEDER FOR KYEPKUBE COMMUNITY**

**BY**

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**REGISTRATION NUMBER: BU/UG/2010/2**

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**A PROJECT PROPOSAL SUBMITTED IN PARTIAL FULFILLMENT OF THE  
REQUIREMENT FOR THE AWARD OF A BACHELOR'S DEGREE IN  
AGRICULTURAL MECHANIZATION AND IRRIGATION ENGINEERING**

**MAY 2015**

## DECLARATION

I BONDET NGEYWO INNOCENT, declare to the best of my knowledge that the piece of this project proposal is as a result of my research and effort and it has never been presented or submitted to any institution or university for an academic award.

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**APPROVAL**

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## **ACKNOWLEDGEMENT**

I would like to extend my sincere thanks to the almighty Lord who has enabled me get to this point in life in order to write my project proposal.

I am indebted to my parents, brothers, sisters, relatives, classmates and friends who have assisted me through guidance and support.

I extend my thanks to all my lecturers of Busitema University at the Faculty of Engineering, Agricultural Mechanization and Irrigation Engineering Department who have equipped me with academic knowledge that has enabled me to succeed in my studies.

## **Abstract**

Cabbages belong to the Cruciferae family and are related to turnips, cauliflowers and Brussels sprouts. The origin of the cabbage is rather obscure as it is one of the oldest vegetables grown, being well known by the ancient Greeks. Cabbages are easily grown under a wide variety of conditions and are adaptable to most areas of the country. Although cool moist weather results in the best quality heads, some varieties produce acceptable heads during the warmer period of the year. Therefore cabbages can be grown on a continuous basis in most of the districts of the country. Cabbage is a popular vegetable amongst farmers because of its adaptability to a wide range of climatic conditions and soil, ease of production and storage, and its food value.

Weed control is one of the most difficult tasks in cabbage growing that accounts for a considerable share of the cost involved in cultivation of cabbage. Farmers generally expressed their concern for effective weed control measures to arrest the growth and propagation of weeds. Chemical method of weed control is more prominent than manual and mechanical methods. However, its adverse effects on the environment are making farmers to consider and accept mechanical methods of weed control. Manual weeding is common in Ugandan agriculture. It is the most widely used weed control method but it is labour intensive. The use of mechanical weeder will reduce drudgery and ensure a comfortable posture of the farmer or operator during weeding. This will resultantly increase production. It's against this background that I have decided to design and fabricate a manually operated inter-row cabbage weeder. There are a number of different manually operated inter-row weeders on the market which are either automatic or manually operated but are quite expensive and cannot be afforded by most of the Ugandan farmers engaged in cabbage growing. The main objective of this project was to design and fabricate a low cost manually operated inter-row weeder.

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# 1 CHAPTER ONE

## 1.0 Background

Weeding is one of the most important farm operations in the cabbage production system. Manual weeding requires huge labour force and accounts for about 25 per cent of the total labour requirement which is usually 900 to 1200 man-hours/hectare (Nag and Dutt, 1979). In Uganda, this operation is mostly performed manually with cutlass or hoe that requires high labour input, very tedious and it is a time-consuming process.

Moreover, the labour requirement for weeding depends on weed flora, weed intensity, time of weeding, and soil moisture at the time of weeding and efficiency of the worker. Often several weeding operations are necessary to keep the crop weed free. Reduction in yield due to weed alone was estimated to be 16 to 42 % depending on the crop and location which involves one third of the cost of cultivation (Rangasamy et al, 1993).

Weeding and hoeing is generally done 15 to 20 days after sowing. The weed should be controlled and eliminated at their early stage. Depending upon the weed density, 20 to 30 per cent loss in cabbage yield is quite usual which might increase up to 80 per cent if an adequate crop management practice is not observed. Cabbages are very sensitive to weeds as reported by Goel, et al (2008). Competition in the early stage of growth and failure to control weeds in the first three weeks after sowing reduces the yield by 50 per cent (Gunaseena and Arceo, 1981).

Weeds compete with crop plants for nutrients and other growth factors and in the absence of an effective control measure weeds remove 30 to 40 per cent of the applied nutrients resulting in significant yield reduction (Dryden and Krishnamurthy, 1977). Delay and negligence in weeding operation affect the crop yield and the loss in crop yields due to weeds in cabbages vary from 40-60 per cent and in many cases cause complete crop failure (Singh, 1988).

Presently there are many types of weeders available in the market, from simple to complex and motorized weeders. Several innovative and cost effective designs are being developed and experimented according to the requirements of the farmers and soil conditions. Efforts are still on to reduce the drudgery in weeding operation. (Thiyagarajan, et. al, 2006) since utilisation of hand tool technology is one of the major problems of poverty in the rural areas. Nganilwa et al. (2003) opined that a farmer using only hand hoe for weeding would find it difficult to escape poverty, since this level of technology tends to perpetuate human drudgery, risk and misery.

The most common methods of weed control are mechanical, chemical, biological and traditional methods. Out of these four methods, mechanical weeding either by hand tools or mechanical weeders are most effective in both dry land and wet land (Nag and Dutt, 1979, Gite and Yadav, 1990, Gite and Yadav, 1985). Various types of cutting blades are used for manually operated weeders. V-shaped sweep is preferred where weeders are continuously pushed and tool geometry of these cutting blades is based on soil-tool-plant interaction (Bernacki et al, 1972). Mechanical weed control not only uproots the weeds between the crop rows but also keeps the soil surface loose, ensuring better soil aeration and water intake capacity. Manual weeding can give a clean weeding but it is a slow process (Biswas, 1990).

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