A case study on weed management and its techniques

M. Sri madhu¹, D. Siva¹, G. Satyanartayana¹, D. Avinash¹, M. Lokesh², K. Ramya sri²

¹B.Tech. student, VFSTR University, Vadlamudi Guntur, Andhra Pradesh, 522213
²Assistant professor, VFSTR University, Vadlamudi Guntur, Andhra Pradesh, 522213

Corresponding author: M.Lokesh
E-mail address: lokeshmadineni@gmail.com

Abstract:
In India, weeds compete with primary crop for soil nutrients (NPK), which are currently Worth 5,000 crores every year. Total crop losses due to weeds are estimated to be approximately Rs. 10,000 crores (Rao, 2000). Weed control is a major concern in dry land agriculture, and producers face some of the most severe challenges faced by the industry. Farmers used a variety of weed management methods, such as traditional sickle equipment, animal-powered weeding, and chemical weeding. However, none of these weed control approaches, which deplete onion energy marginally, are successful, and chemical weed control lowers soil quality. To address this issue, mechanical power operated challenge at times are becoming incredibly common, as they are used to minimize human work while maintaining sufficient efficiency.

Keywords: Weed, agriculture, equipment

Introduction:
Weeds can cause substantial issues on Indian agricultural grounds, especially in warm and humid environments, they can have a massive effect on the kharif. It is one of the world's most expensive agricultural ventures. Comparative studies of farm losses due to weeds and the high cost of pesticides are available. In the kharif season, weed growth is more abundant than in the rabi season, resulting in losses of 20% or more. Weeds increase production expenses while diminishing agricultural yields and quality. Crop losses range from 20 to 30% depending on weed density, but can reach 50% if crop management methods are not executed appropriately. Crop protection technology is required to increase agricultural output. Only plant has been proved to have this ability. Cotton losses were estimated to be 13.60 percent, insect and illness losses to be 35.80 percent, and weed losses to be 33.80 percent. This emphasises the significance of weed control. Rotating weed equipment could more precisely disturb the soil and remove weed roots. In addition, the soil is kept in excellent shape to guarantee that fresh air is available. Cotton and maize, for example. Manual weeding requires a higher level of work input and is also a very time-consuming and labour-intensive activity. Workforce availability is also a big concern in agricultural productivity. Manual weeding and bullock power are ineffective in removing undesired plants, but mechanical power offers some advantages, such as reduced time and increased man working efficiency. A weeding
machine is a type of tillage machine that is used to cultivate soil and weeds, and is especially helpful for farmers with small land holdings. It minimises the amount of effort required by humans. The majority of these gadgets are self-contained. The concept is built on a motor that moves a cutting blade via a gear. For field operations, this is a huge time and cost saver. As a result, it will be particularly useful in agriculture when it comes to tilling and weeding. Develop a combined machine for various tasks with lower operational expenses and shorter operational times than usual, and it should be easily equippable for a single person. Animal-driven tools, such as cultivators and blade harrows, require more energy to achieve the required tillage condition and greater performance than mechanically powered tools. The steering column is simple to maintain in a variety of soil conditions. It's great for mechanising small farms, which account for 80% of the country's acreage. Plant germination and pesticides should be clear choices for smallholders who aim to use mechanical energy sources in farming. One of several agricultural machines is the weed eater. When it comes to moving chores, motor hoes and weeds are not as common as tractors. Farmers and herbivores should be encouraged to work together, especially because most farmers have limited plots of land. As a result, they are unable to purchase more expensive tractors. As a result, the motor hoe and herbicide should become a valuable machine for cleaning the insides of crops that are close by, such as tomatoes, eggplants, sugar cane, soy crops, especially for vegetable growth, and other crops, which are typically grown by smaller farmers. Its main goal is to shrink the workforce because employment are hard to come by in today's economy, and it also minimises working hours. Because it has the potential to be far superior to the current practise. Because bulls ruin the harvest as they alter and roam between fields, they are also a threat to the harvest. We can deduce from the word "weed remover" that there is an operational corner. The name comes from the fact that the steering wheel is powered by an internal combustion engine in this situation. The steering wheel and soil weeds appear to be more effective alternatives for animal strength, increasing need for human labour. Small and small farms make up a significant portion of the rental market for rotary hoes and drills. Rotary cultivators and weed seeders are preferred for challenging agricultural chores such as rowing and preparation on extremely dispersed and tiny farms. Small farmers favour soil cultivators and weeds, which are mostly utilised to earn money by personalizing staff. As a result, this machine provides prospects for rural self-employment. Even peasants and landless workers make efficient and profitable use of self-employed rotary tillage and weeding devices. One of the most important control procedures in vegetable crops is weeding. Weed removal with a Khurpi or Spade is the traditional way of weed control. This is a process that takes a long time. Farmers are unable to complete weeding in a timely manner due to a labour scarcity during peak season. Mechanical weeding allows for better aeration and moisture conservation by keeping the soil surface loose. In our country, the average farmer has roughly 0.5 hectares of land. As a result, they are unable to purchase a more expensive tractor. As a result, hoes and herbicides should be useful devices for cleaning the insides of neighbouring crops like tomatoes, eggplants, sugar cane, and soybeans, particularly for growing vegetables. In the current situation, it is extremely tough, and it cuts working hours, thus its primary purpose is to reduce the workforce. Because it can be far more efficient than traditional labour in terms of processing and the use of bulls. While operating bulls, they can potentially cause damage to the crops. The term "weed remover" indicates that it can be operated with
the help of a motor and an internal combustion engine. These look to be more effective alternatives to animal power, and they appear to be helping to raise demand for human labour. Customers who hire rotary hoes and drills individually are major customers. Walking tractors and sowing machines are favoured for challenging agricultural operations like as rowing and preparing on small, dispersed farms. As a result, this machine provides the opportunity for self-employment in rural areas. Agricultural workers also use the portable tillage and weeders efficiently and profitably.

**Review of literature:**

Weed management research was conducted by S. S. Meena, et al, which is a growing challenge for agricultural production. The presence of weeds in main crops usually reduces the yield by 31.5% (22.7% during the rabbinic season and 36.5% during the day and summer). Depending on the crop, weed infestation rate, method and weed management, the crop loss due to weeds was around 65%. Currently available weeding machines are driven mainly by tractors, which cannot work in small spacing crops due their heavy size. The main components of the weed were a flexible drive shaft, a helical gearbox, a rotor shaft, flanges and blades.

A review about the Indian economy was given by B. Prasant Patil, et al, [2] which is entirely based on the agricultural sector. Rice is the most important and common food in Asia. More than 90% of the world's rice is grown and consumed in Asia, where above 60% of the world's population lives. Rice produces 35 to 60 percent of the calories consumed by three billion Asians. India has 39.19 million hectares of rice with a production of 106.0 million tons. India was the second largest producer in the second half. West Bengal was ranked first in to produce rice in India. it is very important to remove unwanted corps in main fields to improve the yield. It is a plant rich in water, nutrients and lighten the main crop growth. Weeds reduce yield by absorbing 30 to 40 percent of the nutrients. The rice yield in India for the period 2012-2013 was about 85.599 million tons and the total loss of paddy from weeds was about 14.91%. More than 33 percent of production costs goes to control the weeds, resulting in the reduction of farmers' profitable margins.

A development and evaluation done by A.K.M Saiful Islam, et al, [3] about mechanical intervention in agricultural production which is rapidly increasing in Bangladesh. Researchers are finding new ways to manage weeds in the rice field using appropriate mechanical devices instead of traditional manual weeding. Weed control was highest in HW (92%), followed by BPW (78%) and BW (73%). The smallest number of plants (9%) were found to be damaged during BW weeding, compared to BPW (11%), even if the damaged plants recover after a few days. BW and BPW have reduced 74 and 85% of the work need in weeding compared to HW. The highest weeding costs were associated with HW (Tk. 4287 ha-1) compared with BW (Tk. 1103 ha-1) and BPW (Tk.950ha-1). Weed control methods had a negligible effect on grain yield.

Vivek D Raut, et al, [4] reviewed about the agricultural sector, 33% of the cultivation costs are spent exclusively on weeding through traditional tools by using man power. The complex weeding operation is usually done manually using traditional hand tools in the upright position, causing back pain for most of the work. In India, farmers predominantly do
manual weeding, although weeding is slowly becoming popular, although expensive. The use of herbicides will have a complicated effect and changes in soil quality. Burning weed generates more heat and plants and is very expansive compared to other processes. An estimate of 400-600 man-hours per hectare is a normal man-hour need for manual weeding of Rs 2200 per hectare. A desi plough, guntaka pulled by the animals recorded the maximum values of the average effective field capacity and the minimum number of man-hours.

P. O. Ajewole and K. E. Elegbeleye, [8] had develop a speed control and selection system that is incorporated into the existing mechanical khurpi to achieve different cutting speeds at different gears. Maximum engine speeds were set to 1870, 3750, 5620 and 7500 rpm, respectively. From gear 1 to gear 4, the maximum weed efficiency for gear 4 has been set to 80%. The weed destroyer was considered flammable as it consumed 0.8 liters of fuel per hour at top speed and had a maximum weed effect of 0.042 hahr-1 at 4th speed. The cost of manufacturing the machine was Rs 68,000.00. But if it is mass-produced, the cost will be comfortable for local farmers.

Nalini et al. (2011) evaluated weed management practices with chemical treatment and conducted trials in cotton crops. They practiced traditional straw mulching after manual weeding. The application of chemicals lead to reduce the weed growth after mulching and gives a better yield of 58% compared to only manual weeding and straw mulch application.

A conclusion given by Baland A. Y et al., [9] that weed eradication machine should portable and suitable for workers than the conventional tillage method. This machine is designed to reduce the time and effort required to removal of weeds and treatment. The manufacturing cost of this machine is also cheaper than others. This is not enough to reassure the farmers who feed the land.

A study was conducted by Gongotchame et al., (2014) to examine the suitability of six mechanical weeder ring hoe, fixed-spike weeder, curved spike floating weeder, twisted-spike floating weeder, straight-spike weeder and two row spike-and-blade. Weeder has evaluated and compared on the basis of weed management practices. The ring hoe scored highest rank with 97 % farmers preference in the fields of standing water condition and relatively.

A report on weeding efficiency and its performance index made by Srinivas et al. (2010) on L’ shape blade rotary weeder was more effectively weeding than the ‘C’ type and sweep type blades. The ‘L’ shape weeding blade having better soil contact compared to other blades and churning the soil by uprooting weeds was recommend for inter row crop weeding with shallow depth of soil. soil inversion capacity of the L shaped rotary weeder contributed to its higher weeding efficiency.

A development and performance evaluation carried by R.K. Rathod et al., [10] for rotary weeder and calculated its productivity in terms of field efficiency, weeding index and its cost economic. Experiments were carried out with three different crops at three forward speeds (1.1, 1.2 and 1.5 km / h) with different soil moisture content. the experiments were carried out on heavy soil type. The effective field capacity was 1.43 hectares per day. Field efficiency and weed index were 86.34% and 92.23%, respectively. Cost economics and time savings of rotary weeder is about 68.70% and 70% respectively compared to traditional weeding.
Weed control methodology

Advantages of mechanical control of weeds
It is a very select method that could be used in a timely fashion. Herbicide use can be minimised or avoided altogether. It works well against weeds that are difficult to grow. It requires less time and is more efficient.

Weaknesses in mechanical control of weeds
It can damage soil materials, increasing soil erosion and can create soil compaction. Efficiency depends on air, soil moisture and climatic conditions. This may have less flexibility than the other methods. Plants can be injured with mechanical parts and required high skilled person.

Mowing and Challenges
Effective against infertility and fatal weeds Can stimulate the underground system and germinate. Some weeds are too woody to cut. The mower must be cleaned after use to prevent weeds from spreading.

Different responses to mowing
The change from year to year is due to the most effective response to styling before pollination. It continues to grow every two years. Carbohydrate deficiency is most noticeable after cutting perennials and herbicides.

Mowing as weed control
Mowing is done in the mower. This can reduce seed populations. Aesthetically pleasing but requires additional management. This must be repeated to exhaust the plant reserves.

Hand chopping / shooting
Pull up and remove the grass from the ground with the help of sickle or any cutting tools like hoe, spade. It is the oldest form of weed control. More suitable for annuals, efficiency depends on root removal. Used in high value cultures and required more time and labor.

Mulch as weed control
Mulch is a layer of material scattered on the ground. It turns off the light and is a physical barrier to develop of weed appearance. It does not test perennials well. Common materials used for mulch are black plastic / paper, straw, sawdust, wood shavings, bark, crop residues and waste.

Challenges faced while application of mulching
It can be simple and cheap, but the materials can be expensive. Required a mulching machine or implement for laying of mulching layer on bunds. Not all weeds are controlled. Thin areas can allow weeds to grow. The mulch will collapse and need to be replaced because of limited period validation. Plastic mulch causes damage to soil fertility.
Treatment as weed control
Causes or disrupts weeds. Two main types: Primary - breaks the ground with a wooden blade or a chisel. Re-dispose of, collect or cut weeds with cultivators, harrows, etc. The younger the grass, the deep tillage in summer, high temperatures, wind and sun are needed to reduce the risk of regeneration and reduces the growth.

Challenges related to soil tillage
Wet soil treatment destroys the soil structure. Morphological phonological similarities between cereals and weeds. Several weeds leach. Perennial weeds can spread. The seed bank is interfering.

Flames for weed controlling
Use of fire exhaust gun to burn the weeds directly in field. This required permission and take necessary precautions while operating them. Two Type Coated Flame Destroyers-3500°F. Infrared 1700°F.
Flaming weeding produces more heat and it causes the plant and it is very expansive than other process.

Advantages: immediate results, no soil disturbance
Disadvantages: High levels of fossil fuels, they must be careful to avoid illumination of vegetables. Does not work on single-seedlings

Burning as a weed control
Permission may be required.

Advantages: immediate results, no disturbance to soil, adaptation of ecosystems
Disadvantages: noxious fumes, danger, not long lasting, cannot kill seeds

Solarization:
Requirements: Soil moisture, seeds ready, 4-6 weeks, strong sunlight, weak wind, thin clear hard plastic film. There should be no grass / debris at the beginning of the site. Weed types have different sensitivities: uncontrolled clovers. Winter instructions were tested for 4 weeks. Perennial plants up to 6 weeks old.

Conclusion:
We can say that mechanical weed control of a portable machine is cheaper and easier than traditional processing methods. Provides maximum workload with minimum effort. Helps to develop imagination, technical skills and basic knowledge. This machine is designed to reduce the time and effort required for weeds and processing. The production costs of this machine are also cheaper than other machines. By choosing this project, you can understand, understand and comprehend the details of agricultural technology and use this semi-automatic machine for work by reducing labor costs, middle class time and small farmers. Industry. We guarantee that feeding the farmers in our country is our small effort. All production stages are completed.
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