Development of Rotary Weeder with Flex-Fine Harrow for Vegetable Farming Sector

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Abstract- *A rotary power weeder was developed to uproot weeds to increase production. In agriculture, it's a very difficult task to uproot unwanted plants manually as well as using traditional equipment's which may further lead to damage of main crops and weeds are dipped in soil. . This review paper is a short study work towards development of rotary cultivator hoe mechanism with flex fine harrow for weeding which will help to reduce labor cost and to minimize the working fatigue.*

Keywords- Rotary hoe, weeding, uprooting, cultivation,

I. INTRODUCTION

Rotary tillage machine which is used in soil-bed preparation and weed control in arable field and fruit gardening agriculture. It has a huge capacity for cutting, mixing to topsoil preparing the seedbed directly. And also it has more mixing capacity seven times than a plough. Its components works under miscellaneous forces because of power, vibration, pointless, impact effect of soil parts as after reaching to higher side. The design optimization and manufacturing errors can be minimized by its components design analysis and optimization. Especially blades and transmission elements have to be reliable in field the performance against to operating forces. Predicting to stress distributions is so important for the designers, manufacturers and end user. The design optimization of tillage tool is obtained by reducing its weight, cost and by improving a field performance to high weed removal efficiency .The computer aided design analysis by preparing a three dimensional solid modeling and finite elements method applications are getting so widespread in the industry. Thus due to undesired stress distributions on its components, it cannot compensate to the operating forces i.e field environment and results in breakdown and failure due to higher stresses and deformation. The recent trend toward restricting herbicide use due to rising cost and concern over potential health and environmental risks have intensified the search for alternate and integrated weed control strategies that include cultivation. As a result, newly-developed implements are now available to farmers. Mechanical weed control allows farmers to reduce or even eliminate herbicide use, and contribute to a more eco-friendly environment. During mechanical weeding, weeds are mostly destroyed when buried by moving soil. Tools like the rotary hoe or the finger weeder, used at pre-emergence and/or post-emergence of the crop do this as well. The number of passes required varies with the level of infestation. One to two passes are generally needed.

Mechanical weeding is not a new technique for controlling weeds. Hand weeding, which gives nearly complete weed control. Hand weeding may also be combined with mechanical inter-row weeding to deal with weeds left in the crop row. But whatever the level of sophistication of the farming system, there will be times when hand-removal of the odd plant or patch of a particular weed is the most effective way of preventing that weed from proliferating or spreading and becoming a serious problem.

II. TRADITIONAL TECHNIQUES OF WEEDING

1. Manual weeding or Hand weeding
2. Chemical weeding
3. Flame weeding
4. Mechanical weeding
5. Animal drawn blade hoe weeders
6. Tractor drawn weeders
7. Power weeders
8. Push type weeders etc.

III. PROBLEM ASSOCIATED WITH MECHANICAL WEEDING

Ridges posses a special problem because mechanical weeders available in the country are mostly for crops planted on flat fields. Efforts to develop weeders for ridge cultivation in the country have not yielded satisfactory results as weeding is still widely done manually A animal drawn straddle-row rotary weeder for weeding on the ridges. It consisted of two pairs of rotary hoes clamped on a toolbar and aligned with the ridge in a straddle manner. The performance of the weeder indicated a promising device for weed Control on ridges. With adequate weight reduction and slight modifications this weeder could be converted to a manually operated device for use where animal traction is not applicable. This informs the objective of this work which is to develop a hand operated ridge profile inter-row rotary weeder suitable for solving the problem of weeding in farms.

IV. ROTARY CULTIVATOR HOE MECHANISM WITH FLEX FINE HARROW

A rotary hoe is classified as a blind cultivation tool, meaning that it disturbs 100 percent of the soil surface without regard to crop rows. Blind cultivators, such as the rotary hoe, are generally the most effective tools used for in-row weed control in organic field crops. Control of weeds in the row is the most difficult aspect of weed management for organic producers. More options exist for between-row weeds and the windows of opportunity for controlling between-row weeds are wider. The rotary hoe pulls up or shatters weed roots, particularly newly germinated weeds (white thread stage). Some emerged weeds are buried by soil and lack enough energy reserves to emerge again. Remember, if you can see the weed from the tractor, it is probably too big to be controlled by the rotary hoe.

The rotary hoe is most effective when hot and sunny weather helps desiccate uprooted weeds. Humid and cloudy days decrease weed desiccation and some dislodged weeds may re-establish. Weeds that have germinated but not emerged are more susceptible to dislodging. A faster rotary hoe pass (10 to 12 miles per hour) dislodges more weeds. The rotary hoe is less effective when, Weeds you can see from the tractor are not well controlled by the rotary hoe. Or Weeds that already have true leaves are likely to survive. Or A rotary hoe will dig too deeply in soils with high organic matter.

V. CONCEPT DEVELOPMENT

Design and development of the Kinematic linkage for weeder mechanism is as follows:

Kinematic linkage design and drawing of mechanism for weeder flex- fine. Here the weeder arms or twines are developed with a special angular profile such that they approach the weed roots at an angle where in minimal force is requred to remove the weed.

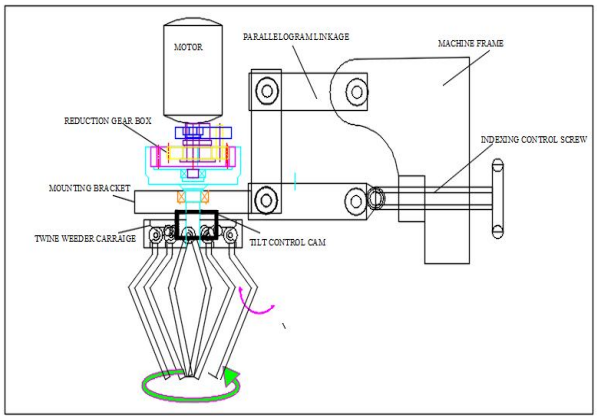

Fig-1: Rotary weeding mechanism

Working of the mechanism is such that when motor rotates the gear box drives the twine carriage such that the followers on the twines move resting against the tilt control cam which makes the twines to oscillate while rotating about central axis this action helps to reach the roots of the weeds thereby resulting in desired uprooting of weed and effective weeding. The parallelogram linkage is used for indexing activity meaning to increase the reach of the rotary weeder to given locating with help of indexing control screw.

VI. SCOPE

1. Increases weeding efficiency
2. Prevents damages to plants as proper reach of the weeder using parallelogram indexer linkage is achieved
3. High torque of device permit weeding action effortlessly.
4. Simple system to implement.
5. Very low pay back time …cheap running cost .
6. Application to open field vegetable farming sector
7. Application to open field horticulture farming sector.

VII. CONCLUSIONS

The main aim of this review paper is to have a proper understanding of different aspects or constraints of weeders as well as different weeding techniques to reduce the efforts which were put in by farmers in terms of money, labour, time, physical efforts for economical cultivation and schemed methodology i.e rotary cultivator hoe mechanism with flex fine harrow for weeding which will help to reduce labor cost and to minimize the working fatigue

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