Giuseppe Pellizzi Prize

CLUB OF BOLOGNA

CLUB OF BOLOGNA

FEDER UNACOMA

Italian Agricultural Machinery Manufacturers Federation

eima 2021 international

A GREAT EIMA, AS USUAL

The Digital Preview (EDP)

11/15 novembre 2020

The Event

3/7 febbraio 2021

Design and Development of Vibratory Tillage Cultivator

Dissertation presented to Malaviya National Institute of Technology Jaipur, Rajasthan, INDIA

R N V Gowripathi Rao Nedunuri

Department of Mechanical Engineering, MNIT Jaipur, INDIA

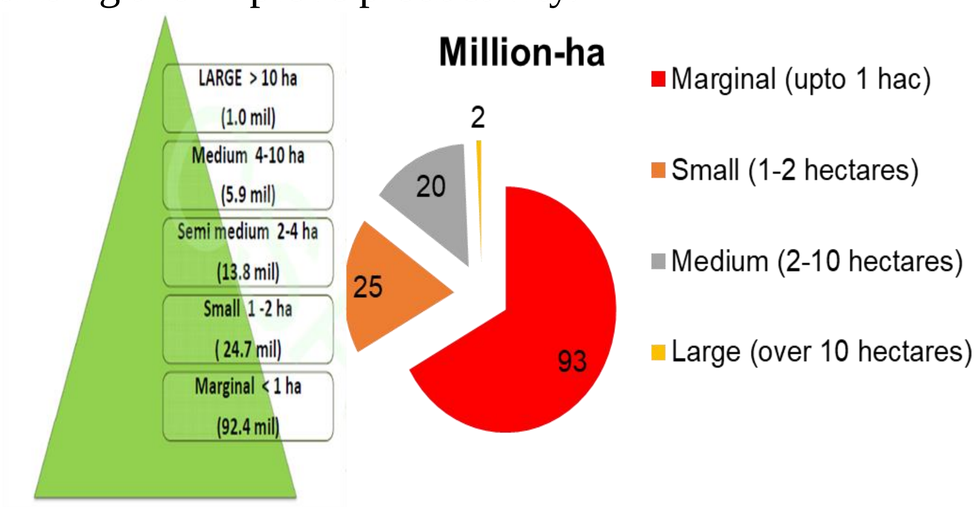
✉: gowripathiraofmpe@gmail.com ☎: + 91-8440085724

1 Developed vibratory tillage cultivator

- A vibratory tillage cultivator is designed and developed in this research work to improve agricultural efficiency parameters.
- Dimensions are yielded through proper mechanical design synthesis procedure to provide vibrations to the cultivator frame.

2 Introduction

- India is a agricultural country and it plays an important role in Indian economy.
- 85 % of the population of Indian farmers comprises of small and marginal landholders which means that they are having land holding between 1-2 hectares.
- Cultivator is a kind of soil engaging tool that is extensively used by farmers and it makes us to think to work on application of vibrations to the tillage system.
- Thus to meet all these there is a need to work and accelerate the process of improved mechanization concepts for small and marginal farmers which can contribute in the nation building and improve productivity.

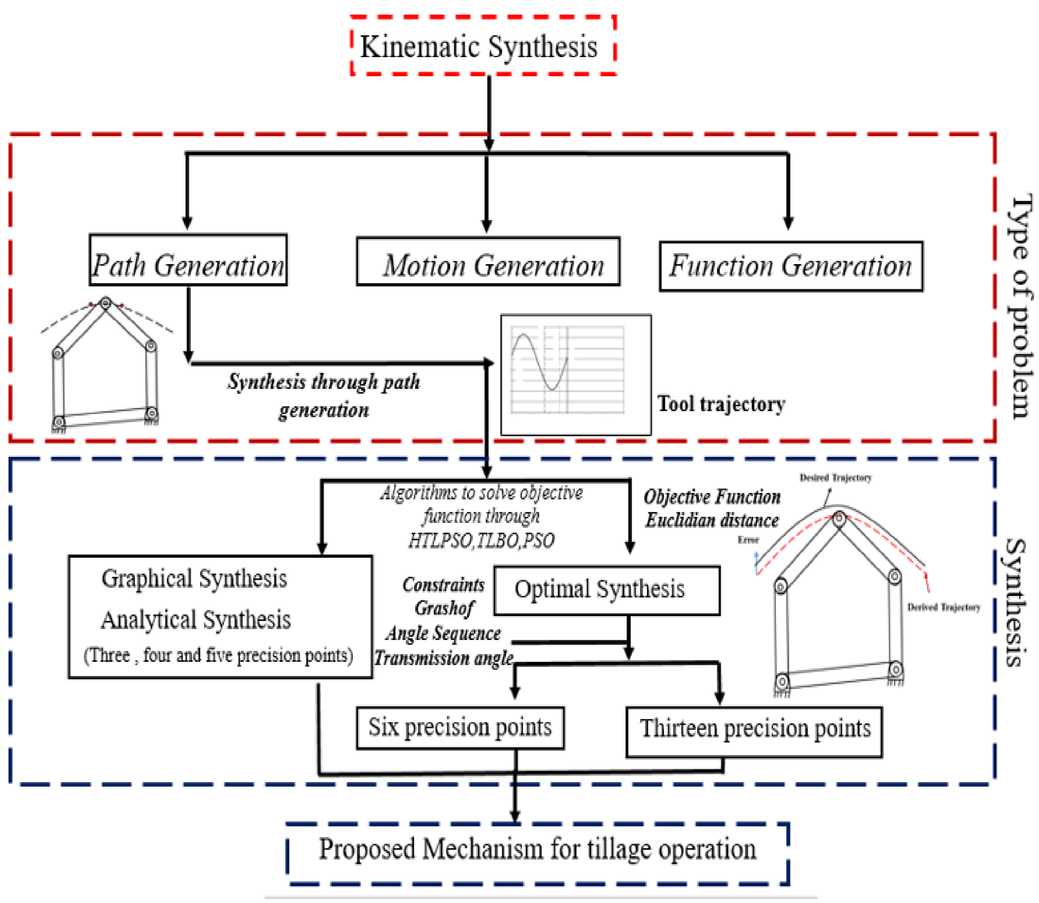


(State of Indian Agriculture 2015-16, Ministry of Agriculture and Farmers Welfare, Government of India).

3 Justification of the Work

- The literature survey concluded that there is a need to explore the active tillage systems properly.
- It is observed that vibratory tillage concept is used for the implement subsoiler to provide oscillation to the wing of the subsoiler.
- Mechanism design concepts have not been properly synthesized, explored and applied in agricultural machinery design in the previous works.
- Vibratory tillage concept is still not fully explored well for the secondary tillage equipment and developing a tractor operated vibratory tillage secondary tillage equipment will definitely boost and encourage the farming community.
- This concluded to work on sustainable efficient and improved agricultural machinery which can enhance the efficiency.

4 Kinematic synthesis procedure for the mechanism



5 Conclusion

Performance comparison of rigid cultivator to developed vibratory cultivator

Performance parameters	Rigid cultivator	Developed vibratory cultivator
Draft (kgf)	250	193
Fuel consumption (litre/hr)	3.5-4.0	2.02-3.0
Depth of Cut (cm)	10-15 cm	15-25 cm
Power Consumption (kW)	1.68	1.37

- It is established from the preliminary field evaluation that the developed prototype consumes less draft and power as compared to the rigid cultivator (traditional cultivator).

6 Selected Publications and Patent

- Rao, G., Chaudhary, H., and Sharma, A. (2018). Design and analysis of vibratory mechanism for tillage application. **Open Agriculture**, 3(1), 437-443**.**
- Rao, N. G., Chaudhary, H., and Sharma, A. K. (2019). Optimal design and analysis of oscillatory mechanism for agricultural tillage operation. **Springer Nature Applied Sciences**, 1(9), 1003.
- Rao, N. G., Chaudhary, H., and Sharma, A. K. (2019). Design and development of vibratory cultivator using optimization algorithms. **Springer Nature Applied Sciences**, 1(10), 1287.

➢ **Patent Filed :**

N R N V Gowripathi Rao, Himanshu Chaudhary, Ajay Kumar Sharma "An Improved Tillage Cultivator" **(Reg/Ref: No.201911019499)** filed by IPO New Delhi on 17-05-2019.