R. P. F. III

FINAL REPORT

1. Institute Code No. **Tech XIII(231)**

2. I. C. A. R. Code No. **P1-92/7-ICI-N10/0311**

3. Name and Address of Research Institute/~~Centre~~: **Central Plantation Crops Research Institute, Kasaragod, Kerala.**

4. Project Title: **Design and development of power tiller operated basin opener.**

5. Name and Designation of Project Leader: **T. Vidhan Singh**
Scientist (Farm Mach. & Power)

6. Name(s) and Designation(s) of Project Associates including Project Leader and work to be done:

Sl. No.	Name and Designation	Time spent	Work done
1.	**T. Vidhan Singh** **Scientist (FM&P)**	**100%**	**Design, development, fabrication, testing and report writing**

7. Location of Research Project with complete address (Division/Section/Sub-Centre)

Pre & Post harvest technology division,
Central Plantation Crops Research Institute,
Kasaragod, Kerala - 671 124

8. Date of start **May, 1992**

9. Date of termination **May, 1996**

10. (a) Objectives (Not more than 150 words)

To mechanically dig upto 20 cm depth and 1.8m radius around the coconut palm using a power tiller.

(b) Practical Utility including background information (Not more than 150 words)

Every year, the basin around the coconut palm is opened twice for applying organic as well as inorganic manure upto a depth of 15-20 cm and 1.8m wide. This work is time consuming and labour intensive. To decrease the cost of opening the basin the above project has been undertaken.

CENTRAL PLANTATION CROPS RESEARCH INSTITUTE

KASARAGOD-670 124, KERALA

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Project No. **Tech XIII(231)**

11. Technical Programme: Date of Start: **May, 1992**

1992-1996

1. Design and development
2. Fabrication of designed parts.
3. Assembling on the main frame.
4. Field evaluation
5. Modifications if necessary
6. Field testing for efficiency.

Technical Programme - 1992-1993

1. Purchase of power tiller
2. Design of different components
3. Fabrication of parts
4. Assembling of parts fabricated.

Technical programme - 1993-94

1. Fabrication of soil dispenser
2. Design of soil dispenser
3. Fabrication of soil dispenser
4. Field testing.

Technical Programme - 1994-95

1. 1. Fabrication of modified scraper
   2. Fabrication of soil dispenser
   3. Field testing.

Technical Programme - 1995-96

1. Modification of scrapor
2. Modification of soil dispenser
3. Testing with cage wheels.
4. Testing for efficiency.

CENTRAL PLANTATION CROPS RESEARCH INSTITUTE
KASARAGOD-670 124, KERALA

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Project No. Tech XIII(231)

12. Final Report: 19 92 —1996 Date of Start May, 1992

Design and development of power tiller operated basin opener.

(Attached separately)

DEVELOPMENT OF POWER TILLER OPERATED BASIN OPENER

T.Vidhan Singh

INTRODUCTION

India is one of the leading Countries of the world in area and production of coconuts with an estimated area of 1.52 million ha. having the highest productivity of 7500 nuts/ha. India is 2nd only to Indonesia in terms of production of coconut. Most of the coconut gardens are in the coastal areas and the spacing is about 7.5m x 7.5m . As the power tiller is a small machine. having a small turning radius. as compared to tractor. the power tiller has been chosen for the present work. Also. the cost of a power tiller is much less as compared to a tractor and is a multipurpose machine suitable for all odd jobs of the farmers like ploughing. inter cultivation. puddling. furrowing. power takeoff and haulage etc.

The coconut palm has an adventitious root system. typical of a monocot. About 74% of the roots produced did not have lateral spread beyond 2m from the bole. Regular cultivation reduced root proliferation in the top 30 cm layer of the soil. Most of the roots were confined to 30 cm to 120 cm depth.(Kushwah B.L. et al.,1973). Keeping the above points in mind. the design and fabrication of a power tiller operated basin opener was undertaken.

MATERIALS AND METHODS

A powertiller,Kubota was used in the present testing.The basic concept used was to shift the soil to one side using one sided rotary blades. This was achieved by selecting the blades from two sets of blades. The end blades were modified to avoid touching the frame of the powertiller frame by modifying the curvature of the blade. The basin opener is fabricated using 18 gauge

M.S. sheet,6×80×760 mm spring steel plate and 6×25 mm flat.A rectangular structure with straight surface at the left side (from behind the power tiller) and curved surface at the right side was fabricated.M.S. sheet of 18 gauge thickness,200 mm width,at left end and 300 mm at the right end is gradually curved from left to right for easy moment of soil. A spring steel plate of 6×80×760 mm, with the bottom end sharpened to cut the soil,is welded to the lower portion of the M.S. sheet. The entire frame is hinged at four points of the rotor frame of the power tiller at an angle of 10° for the displacement of soil towards the right side during anticlockwise moment (Fig.-1).

RESULTS AND DISCUSSION

The power tiller operated basin opener was field tested extensively at CPCRI Kasaragod. It was observed that shifting of soil to one side, forming a basin during anticlockwise movement of the power tiller was possible using the implement attached behind the modified rotor blade set. It takes about 4-5 minutes in sandy loam soil and about 7-8 minutes in other types of soils to form one basin of 20 cm depth and 1.8m radius. The moisture content during test ranged from 80% to 100% i.e., immediately after the monsoon subsided. During test operation, it was observed that for effective forward movement during 100% m.c, cage wheels were more effective than pneumatic wheels. Due to 100% m.c, it was observed that the rotating wheel of the power tiller (the other wheel is almost without power) used to skid at some places, thereby making the power tiller's forward movement almost nil. Under such circumstances, the power tiller was lifted manually and transferred ahead reducing the depth of cut. This can be avoided if the depth of soil cut is restricted to about 5-6 cm. But then, the effective time for making one basin will increase to about 6 minutes. The total load on the

power tiller was about 60-70 Kg-m tangential to the movement of the power tiller. Provision has been made to change the angle of the scraper blade with respect to the rotor shaft for most effective soil shifting. This adjustment is simple and can be achieved by changing the hole of the blade holder to either side. The power tiller has to be fitted with one sided blades so as to throw the soil on one side. The blade of the soil dispenser does not require any resharpening as it is made of spring steel,unless it comes into contact with heavy stones during operation.The total number of basins that can be opened in one day of 8 hours duration is about 96,where as in the traditional method of opening by labourer,a maximum of 12-15 basins can only be opened.As this job is difficult,cost/labourer is also high and it works out to be almost double/basin.Also as this is a time bound operation,using a power tiller this operation can be done in the shortest possible time.

Economics of power tiller operated basin opener

Case-I With Pneumatic Wheels:

Fixed cost

Cost of implement	Rs 1000.00
Cost of blades	Rs 800.00
Cost of other accessories	Rs 200.00
Total fixed cost	Rs 2000.00

Recurring cost

Depriciation	Rs20.00
Hire charges of powertiller	280.00
Maintenance cost per day including the cost of driver and diesel charges	Rs 90.00
Total recurring cost	Rs370.00

No of basins opened in one day is 96

Therefore cost of opening one basin is RS 4.05

Case II: With cage wheels

Fixed cost

Cost of implement	Rs 1000.00
Cost of cage wheels	Rs2800.00
Cost of blades	Rs 800.00
Cost of accessories	Rs 200.00
Total fixed cost	Rs 4800.00

Recurring cost

Depreciation	Rs40.00
Hire charges of powertiller per day	Rs300.00
Fuel cost and maintenance cost	Rs90.00
Total recurring cost	Rs430.00

No of basins opened in one day is 96

Therefore cost of opening one basin is RS 4.47

CONCLUSION

Basin of size 1.8m diameter and 20 cm depth around the coconut palm can be made using the above attachment behind the power tiller with modified rotor blades in about 4-5 minutes. This will be very useful for timely application of organic as well as inorganic fertilizer. Also, this will be saving the cost of application of fertilizer. This will be very useful for large and medium holders who have their own power tiller. The cost of opening one

13. Approximate expenditure incurred in the Project: (Give reasons for variation, if any, from original estimated cost)

Rs. 1,37,000/- (including the cost of power tiller)

14. Publications and material (one copy each to be supplied with this proforma)

a) Research papers — Under print

b) Popular articles — Nil

c) Reports — In CPCRI Annual Report 1994, 1995 and 1996

d) Seminars and workshops (Relevant to the Project) in which the Scientists have participated:

e) Material developed (such as new varieties of crops or breeds of farm animals, implements, products, etc.)

Developed new implement i.e. Basin opener to make a basin of 1.8m radius and 15-20 cm depth around the coconut palm using a power tiller with modified roter blade for applying fertilizer.

15. Details (Nos. etc.) of Field/Laboratory Note books and final material and their location

In project file, Pre & PHT Division,
CPCRI, Kasaragod.

16. Comments/suggestions of Project Leader regarding possible future line of work that may be taken up arising of this project:

- NIL -

17. Signatures with name of Project Leader and Associates:

9/5/97

(T. Vidhan Singh)
Scientist (FM & P)

18. Signature (with comments, if any) of Head of Division/Section/Station:

Madhavank

(K. Madhavan)

19. Signature (with comments, if any) of Director:

(Dr. M.K. Nair)

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