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Doubling the Income of Farmers for Harvesting Ginger Crop through Tractor Drawn Ginger Digger-Cum-Elevator

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Abstract – **Ginger is a plant recently gaining attention in the food and pharmaceutical industries because of its spice and medicinal importance. The prototype of tractor mounted ginger digger cum elevator was evaluated in black and red soil in research field and compared with manual harvesting under similar conditions. The field capacity was 0.085 hectare per hour and the harvesting efficiency was 77.27 per cent with damage caused to the rhizome being less than 3.29 per cent. In manual harvesting, the harvesting capacity was 85.90 per cent with damage caused to rhizome being 4.26 per cent and percentage of rhizome lift being 98.76 per cent, whereas it was 99.01 per cent when harvested with ginger harvester-cum-elevator. The cost of the harvester is Rs. 80,000 and the cost of harvesting per ha was Rs. 35,738 whereas manual was high about 70,000 per hectare. The breakeven point was 16 ha per annum and the payback period was 2.0 years. The saving in cost over manual harvesting of ginger with the harvester was 48.94 per, cent.**

Keywords **– Ginger, Digger, Harvesting, Elevator and Tractor Drawn Harvestor.**

I. INTRODUCTION

Ginger (*Zingiberofficinale*) (Family: *Zingiberaceae*) is an herbaceous perennial, the rhizomes of which are used as a spice. Ginger is cultivated in several regions of the world *viz.,* India, China, Japan, Indonesia, Australia, Nigeria and West Indies islands. Among these, India and China are the dominant suppliers to the world market. In India, ginger is cultivated in Kerala, Karnataka, Mizoram, Arunachal Pradesh, Assam, Meghalaya, Nagaland, Manipur, Tripura, Sikkim, Orissa and Madhya Pradesh (Hazarika and Kakoti, 2013). However, Karnataka, Orissa, Assam, Meghalaya, Arunachal Pradesh and Gujarat together contribute 65 per cent of the country's total production. During 2015-16, the ginger production in India was reported as 0.760 million tonnes from an area of 0.142 million ha, with an average productivity of 5.4 tonnes per ha. However, in Karnataka the ginger production was 0.019 million tonnes from an area of 0.0524 million ha, with an average productivity of 2.80 tonnes per ha (www.indiastat.com).

Traditionally ginger crop is harvested manually using pickaxe, digging fork or space. It is time consuming, less efficient and full of drudgery. Tractor drawn blade harrow is not practical and it is not economical to use in raised bed system. At present situation sufficient man-power is not available which delays the harvesting results in damage the cops. It was observed that the harvesting potato crops using potato digger cum elevator reduces 75 % labour and 50% operating time compared to conventional method of manual digging of with spades. It also results in 4-5% reduction in harvesting losses (Devesh Kumar and Ashok Tripathi, 2017). The harvesting operation of ginger needs to be mechanized for time saving, reduce drudgery and also to reduce harvesting cost.

Keeping in view of the above facts, a studies conducted on "Cost economics of ginger digger cum elevator for harvesting ginger crops and compared with the manual method of harvesting.

II. MATERIALS AND METHODS

The economics of the tractor drawn ginger digger cum elevator will be helpful in decision making for purchasing a ginger digger cum elevator for individual farmer to own a machine or its custom hiring. There was two components of the cost of a machine namely; fixed cost and variable cost. Fixed cost includes depreciation, interest, insurances taxes and housing. Variable cost includes fuel, lubricants, operator's wages and repair and maintenance cost. The cost of operation of tractor drawn ginger digger cum elevator was compared with conventional practice of digging by spade. The standard procedures were used in determine the cost of operation of the ginger digger cum elevator (Table 1).

III. RESULTS AND DISCUSSION

The prototype of tractor drawn ginger digger cum elevator was evaluated in in Research field at College of Horticulture, Bidar, Karnataka, and compared with manual harvesting under similar conditions. The field capacity was 0.085 hectare per hour and the harvesting efficiency was 77.27 per cent with damage caused to the rhizome being less than 3.29 per cent. In manual harvesting, the harvesting capacity was 85.90 per cent with damage caused to rhizome being 4.26 per cent and percentage of rhizome lift being 98.76 per cent, whereas it was 99.01 per cent when harvested with ginger digger-cum-elevator (Table 2). The cost of the harvester is Rs. 80,000 and the cost of harvesting per ha was Rs. 35,738 whereas manual was high about 70,000 per hectare. The breakeven point was 16 ha per annum and the payback period was 2.0 years. The saving in cost over manual harvesting of ginger with the harvester was 48.94 per, cent (Table 3).

Table 1. Cost economics of tractor mounted ginger digger-cum-elevator

SI No.	Particulars	Tractor	Digger-cum-elevator	Tractor drawn digger cum elevator
1	Depreciation (Rs/hr)	40.00	21.42	61.42
2	Interest @ 10 %	36.66	9.17	45.83
3	Housing @ 1 %	6.67	1.67	8.34
4	Taxes @1 %	6.67	1.67	8.34
5	Insurance @ 1 %	6.67	1.67	8.34
6	Repair & Maintenance @ 6 %	40.00	10.00	50.00
7	Total Fixed cost (Rs/hr)	136.64	45.41	182.05
8	Annual Fixed cost (480 hours/annum) Rs/year	65587.20	21792.76	87379.96
9	Total operating cost (Rs/hr)	442.31	45.412	487.72

Table 2. Performance of the Digger cum elevator v/s Conventional Practices

SI. No.	Treatments	Parameters		
		Capacity (ha/h)	Damage (%)	Rhizome lift, (%)
1	Ginger digger cum elevator	0.085	3.29	99.01
2	TNAU, harvester	0.110	4.05	97.03
3	Conventional Practices	0.0013	2.07	98.76

Table 3. Comparison between Conventional harvesting and Ginger digger-cum-elevator

SI. No.	Particulars	Conventional Method	Ginger harvester-cum-elevator
1	No. of women labours, No's	300	200
2	No. of man labour, No's	100	-
3	Wages for women labour/day	150	150
4	Wages for man labours/day	250	-
5	Women labour charges, Rs	45,000	30,000
6	Man labour charges, Rs	25,000	-
7	Cost of Digging operation, Rs	25,000	5738
8	Cost of harvesting, cleaning and collection, Rs	70,000	35,738
9	Saving in cost over Conventional practices	-	34,262
10	Saving in cost, percent	-	48.94

Glimpses about Different Methods of Harvesting Techniques

CONVENTIONAL METHOD OF HARVESTING

DAMAGE COUSED DURING CONVENTIONAL HARVESTING

TNAU MODEL HARVESTER

TRACTOR DRAWN GINGER DIGGER CUM ELEVATOR

IV. CONCLUSIONS

Tractor drawn ginger digger cum elevator is suitable for digging and exposing rhizomes. The cost required for development of digger cum elevator was Rs. 80,000 and the cost of harvesting per ha was Rs. 35,738 whereas manual was high about 70,000 per hectare. The breakeven point was 16 ha per annum and the payback period was 2.0 years. The saving in cost over manual harvesting of ginger with the harvester was 48.94 per, cent. Adoption of suitable method of harvesting technologies for timely harvesting operations, reduction in drudgery, reduction in man-power and minimizes the losses as well as vacating the field at the earliest for planting for the next crop which results doubling the farmers income. This helps in generating entrepreneurship opportunities and up-liftmen of socio-economic condition of the farming community.

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