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Economic Viability and Financial Feasibility of Installing Drip Irrigation System Without Subsidy in Coconut Cultivation In Srikakulam District of Andhra Pradesh.

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ABSTRACT

Economic viability and financial viability of drip irrigation system without subsidy was assessed by personal surveys from 45 drip adopted and 45 drip non adopted Coconut farmers from nine villages of three mandals in Srikakulam district, during 2013-14. The discounted cash flow techniques like NPW, BCR, IRR and N/K ratio were used to assess the economic viability of drip irrigation system without subsidy. But Drip irrigation system in Coconut cultivation without subsidy is also economically viable as revealed by BCR ratio which is greater than one and IRR greater than the market rates of interest extended to Coconut plantations by banks and also with N/K ratio is greater than one. The economic analysis of drip irrigation with subsidy and without subsidy indicates that drip irrigation is economically viable even without subsidy in Coconut cultivation.

Key words*: Coconut,Drip irrigation, Economic viability, Financial viability and Subsidy*

Drip method of irrigation (DMI) supplies water constantly at regular intervals to the root zone of the crop through a network of pipes with the help of emitters. Unlike the conventional method of irrigation, the efficiency of water use is extremely high in DMI as it substantially reduces the evaporation, conveyance and distribution losses of water (Narayanamoorthy and Deshpande, 2005). DMI also reduces the cost of cultivation required for performing the operations like ploughing, weeding, irrigation, labour and energy use compared to the conventional method of irrigation (Narayanamoorthy, 2001).

In addition to helping conserve water and fertilizers, drip irrigation can also help reduce the problems of salinization and water logging. Additionally, in water scarce environments, drip irrigation may allow for agriculture in areas where furrow or flood irrigation would not be possible. The subsidy per cent in Andhra Pradesh varies according to the land holdings of the farmers i.e., 90 per cent (< 5hectares), 75 per cent (5-10 hectares) and 60 per cent (>10 hectares) (APMIP, 2014).

The coconut palm (*cocos nucifera*) is one of the most useful plants to the mankind. Coconut supports the livelihood security for millions of small and marginal farmers spread over 93 countries worldwide. Although the coconut is grown mainly for its nuts, it provides many by-products of immense utilities and industrial applications. It is eco-friendly and environmentally sustainable.

Coconut is grown in more than 18.95 lakh hectares in the country with an estimated production of 16943 million nuts and average productivity of 8937 nuts per hectare during 2010-11. Four southern states put together account for 92 per cent of the total production in the country (Kerala 45.22 per cent, Tamil Nadu 26.56 per cent, Karnataka 10.85 per cent, Andhra Pradesh 8.93 per cent and other states 8.44 per cent).

Coconut has been observed to respond well to irrigation, the increase in yield being over 30 nuts/ palm/ year. Traditionally, coconut gardens are flood or basin irrigated. In such cases the irrigation efficiency is only 30 to 60 per cent due to the wastage of water. Besides, there is wastage of labour and energy in adopting this system of irrigation. Scarcity of irrigation water and increasing cost of labour and energy are posing serious threat to the economic viability of coconut production. Hence, Drip irrigation is practiced in coconut to conserve water, save labour and power, increase water and fertilizer use efficiency, to optimise yield.

MATERIAL AND METHODS

The present study was carried out in Srikakulam district of Andhra Pradesh state during 2013-14. The costs and returns of Coconut regarding the drip and conventional method of irrigations were generated with personal surveys of drip adopted and drip non adapted sample farmers selected from nine villages of three mandals in the district. From each selected village, 5 drip adopted and 5 drip non-adopted farmers were selected thus, 45 adopted and 45 drip non adopted farmers were selected for the study.

Net Present Worth (NPW)

The more straight forward discounted cash flow measure of project worth is net present worth. The net present worth should be positive to indicate that the project investment is economically feasible and financially viable.

Mathematically, it can be represented as

$$\text{Net present worth} = \sum_{t=1}^{n} \frac{B_t - C_t}{(1+i)^t}$$

Where B_t = benefits in rupees for t^{th} year

C_t = cost in rupees for t^{th} year

i = discount rate (11.5 per cent)

n = number of years (50 years)

Benefit-Cost Ratio (BCR)

It is the ratio between discounted cash inflows and discounted cash outflows and the ratio should be unity (or) more for an investment to be considered worthwhile.

Mathematically, it can be represented as

$$\text{Benefit-Cost ratio} = \sum_{t=1}^{n} \frac{B_t/(1+i)^t}{C_t/(1+i)^t}$$

Where

B_t = benefits in rupees in t^{th} year

C_t = cost in rupees in t^{th} year

n= number of years (50 years)

i = discount rate (11.5 per cent)

Internal Rate of Return (IRR)

It represents the average earning capacity of an investment over the economic life period of the project. It is that discount rate which just makes the net present worth of cash flow equal to zero. In other words, the benefit-cost ratio calculated at IRR is unity.

Mathematically, it can be represented as

$$\text{IRR} = \sum_{t=1}^{n} \frac{B_t - C_t}{(1+i)^t} = 0$$

Where n= number of years

i = discount rate

B_t = benefits in rupees in t^{th} year

The IRR should be more than the discount rate being considered for economic feasibility and financial viability.

$$\text{IRR} = \text{Lowe (discount) rates} + \text{Difference between the two discount rates} * \frac{\text{NPV at lower discount rate}}{\text{sum of NPV at low and higher discount rates}}$$

Table: Economic viability of Coconut plantations with drip irrigation with and without subsidy component.

S.No	Discounted Cash flow technique	Drip method of irrigation		Conventional method of irrigation
		Drip irrigation Without subsidy	Drip irrigation with 90 per cent	
1	NPW (Rs.)	501500.60	537165.58	254370.58
2	BCR	2.02	2.18	1.49
3	IRR(Per cent)	24.59	26.86	21.67
4	N/K Ratio	3.99	4.74	2.46

C_t = cost in rupees in t^{th} year

Net Benefit-Investment Ratio (N/K Ratio)

This is one of the discounted techniques used for selecting the beneficial project among alternative projects. The selection criterion is that the project is accepted, if its N/K ratio is greater than one and higher when two projects are compared.

$$\text{N/K ratio} = \frac{\text{Present worth of the sum of positive net incremental benefits}}{\text{Present worth of the sum of negative net incremental benefits}}$$

RESULTS AND DISCUSSIONS

Drip irrigation system (DIS) is an expensive technology with an initial capital cost of Rs. 29,435.00 per hectare of Coconut plantation. The subsidy is provided to the farmers at different rates based on the size of the holding. Farmers having < 5 hectares, 5-10 hectares and > 10 hectares are provided with subsidy rates of 90 per cent, 75 per cent and 50 per cent respectively.

The analysis revealed that the NPW of drip irrigation without subsidy, drip irrigation with 90 per cent subsidy was Rs. 5, 01,500 and Rs. 5, 37,165 respectively, while in case of conventional method of irrigation it was Rs. 2, 54,370.

B-C ratio of drip irrigation without subsidy and drip irrigation with 90 per cent subsidy accounted for 2.02 and 2.18 respectively, while in case of conventional method of irrigation it was 1.49. IRR for drip irrigation without subsidy, drip irrigation with 90 per cent subsidy was 24.59 per cent and 26.86 per cent respectively and it was 21.67 per cent for conventional irrigation.

Similarly the N/K Ratio for drip irrigation without subsidy and drip irrigation with 90 per cent subsidy accounted for 3.99 and 4.74 respectively, while in case of conventional method of irrigation it was 2.46.

The economic analysis of drip irrigation with subsidy and without subsidy indicates that drip irrigation is economically viable even without subsidy in Coconut cultivation. As revealed by BC ratio which is greater than one and IRR greater than the market rates of interest extended to Coconut plantations by banks and also N/K ratio is greater than one.

Narayanamoorthy (2005) also estimated that NPW and BCR with and without subsidy under discount rates and concluded that drip investment was economically viable without subsidy in sugarcane, grapes and banana.

Drip irrigation system showed an increase in production of sugarcane crop by 27.65 per cent, per hectare net returns by Rs.20234.00 over Rs. 17861.00 under the non-drip category of farmers with B:C Ratio of 1.51 and 1.25 with and without subsidy option showing its economic viability (Waykar *et al*, 2003).

The earlier research study results available (INCID 1994, Sivanappan 1995, Narayanamoorthy 2005) also confirmed that the cultivation of several vegetable crops, fruit crops and plantation crops are economically viable without subsidy in drip units.

It can be concluded that the adoption of drip irrigation in Coconut is economically viable even without subsidy component as there is a significant amount of saving in irrigation water, electricity, cost of cultivation and a substantial increase in the productivity.

CONCLUSIONS

1. Considering the high yield per hectare through drip method of irrigation in Coconut cultivation compared to conventional method of irrigation, drip irrigation technology should be expanded to all the Coconut cultivation areas as a mandatory as majority of the farmers are small farmers and is financially viable even without subsidy.

2. Since Coconut plantations with DMI are viable financially and economically even without subsidy in drip irrigation system. Hence subsidies can be rationally reduced. As an alternative for reduction of subsidies, loans from banks could be provided for adoption of DIS in Coconut cultivation especially for the small farmers.

LITERATURE CITED

INCID 1994 Drip irrigation in India. Indian national committee on irrigation & drainage, ministry of water resources, Govt., of India, New Delhi.

Narayanamoorthy A 2001 Impact of Drip Irrigation on Sugarcane cultivation in Maharashtra. Agro-Economic Research Centre. Conference paper. Gokhale Institute of Politics and Economics. Pune..

Narayanamoorthy A 2005 Economics of Drip Irrigation in Sugarcane Cultivation: Case Study of a Farmer from Tamil Nadu. *Indian Journal of Agricultural Economics*. 60(2): 235-248.

Narayanamoorthy A and Deshpande R S 2005 Where water seeps! towards a new phase in India's irrigation reforms. Academic Foundation. New Delhi..

Sivanappan R K 1995 Present status and future of microirrigation in India. Microirrigation for a changing world: conserving resources/ preventing the environment. Proceedings of the Fifth International Microirrigation Congress, Orlando, Florida, USA, 2-6 April, 1995. 740-744.

Waykar K R, Shinde H R, Sale Y C, Kasar D V 2003 Economics of drip irrigation system for sugarcane crop in ahmednagar district of Maharashtra State. *Indian sugar,* 53(4): 251-259.

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