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ENERGY USE IN CROP PRODUCTION SYSTEM IN TWO DIFFERENT FARM SITUATIONS - A CASE STUDY

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ABSTRACT

A study was conducted in Ikkaraiboluvampatty village to get an accurate insight into the crop production system. A total number of 15 respondents practicing traditional farm technologies and 15 respondents practicing innovative farm technologies were selected and their energy use pattern assessed. Sorghum crop was considered as a representative crop. On an average the traditional farms utilised 8103.80 MJ/ha and the mechanised farms 10246.00 MJ/ha. The energy imput ratios for both traditional and mechanised farms were 13.23 and 23.78, respectivelly. Thus the energy use efficiency was higher in mechanised farms as compared to traditional farms. Eventhough the input energy was high in mechanised farms, their corresponding increase in output energy showed the relative performance of factor inputs.

Energy is one of the most important critical factor inputs directly contributing to the productivity of land. Ariculture is both a producer and a consumer of energy. Agriculture consumes approximately 3.5% of the total energy, of which 2.9% is used by developed countries and 0.6% by developing countries. During the last few decades improved farm implements have been used as an alternate energy input in crop production system in order to speed up the timeliness of farm operations and improve farm efficiency and to realise the maximum net revenue in agricultural operations. A systematic analysis of the problems of energy requirements of different activities of agricultural sector will provide suitable policy options for implementations.

The basic objectives of the study were (a) to get an accurate insight into the crop production system in terms of their energy use and (b) to analyse the energy input use for suggesting suitable options for implementation at farm level.

METHODOLOGY

A total number of 30 farm families (15 respondents practicing age old farm technologies) were selected by random sampling proceedure in Thondamuthur block, Coimbatore district. Information relating to the type of implements used for soil and moisture conservation and the consequent changes in the adoption of innovative technologies were collected. Throughout this paper the standard international unit Joules was used to express the energy consumption level.

RESULTS AND DISCUSSION

The present study evaluates the energy input and output, and the improvement in monetary return due to the use of improved farm tools and implements. The primary concern of the study is to estimate the energetics of sorghum crop, taking into account the inputs like seeds, fertilisers, chemicals and various farm operations carried out by traditional and innovative farms. The study quantified and estimated the energy use pattern in traditional farms and in farms using soil and moisutre conservation energy gadgets like basin lister and wide bed former cum seed drills. For computing the equivalent energy of different inputs and energy sources the energy co-efficients as suggested by Mittal and Dawan (1985) were used.

Levels of energy use

To calculate the energy input use in crop production system, rainfed sorghum was chosen as a representative dry land crop. The energy use pattern for various farm operations for sorghum

Table 1. Activitywise energy use in mechanised farms (in mega Joules).

Farm Activities	Energy use	Percentage
Field Preparation	410.59	4.01
a. Implement Energy	7.62	
b. Bulock Energy	344.22	
c. Human Energy	58.75	
Water Conservation Operations :		
a. Mechnical Energy	393.06	3.84
i) Tractor Energy	19.68	
ii) Implement Energy	13.21	
iii) Fuel energy	300.17	
b. Human Energy for Operating Tractors	3.96	0.04
Farm Yard Manure	7733.06	75.46
Farm Yard Manure Application	29.10	0.28
Seeds	405.42	
Sowing Operation		
a. Mechnical energy	474.34	4.13
i) Tractor Energy	20.14	
ii) Implement Energy	27.10	
iii) Fuel Energy	427.10	
b. Human Energy for operating Tractors	4.91	0.05
Human and Mech. Energies for Weeding operation	231.16	2.26
Human Energy for Harvesting, bundling, transporting and threshing	561.43	5.48
Input Energy	10246.00	100.00
Output Energy	243672.76	
Output-Input Ratio	23.78	
Net Returns (in Rs.)	1794.67	

One Mega Joule = 10^6 Joules

crop is given in Tables 1 and 2. Under preparatory cultivation implement energy, bullock energy and human energy were accounted. The bullock energy use was found to be 344.22 MJ/ha, implement energy 7.62 MJ/ha.and the human energy 58.75 MJ/ha. for mechanised farms. For preparatory cultivation the traditional farms used 469.47 MJ/ha. which is higher than that for the mechanised farms. The increased amount of energy use was due to the excessive use of bullock energy. Moreover the traditional farms did not adopt any soil and moisture conservation operations. Hence increased number of ploughings was done to enrich moisture storage in the soil.

Soil and moisture conservation implements used up an additionl energy of 393.06 MJ/ha.ie.,3.84 per cent of the total energy. The moisture conservation operation encompassed both mechanical and human energy for operating the tractors. Application of farm yard manure required the use of 7733.06 MJ/ha in mechanised farms and 6072.19 MJ/ha in traditional farms. The application of farm yard manure in both the categories used more or less uniform amount of energy. As far as seed energy is concerned, it was 405.42 MJ/ha in mechanised farms and 372.91 MJ/ha in traditional farms. It is interesting to note that the use of excessive quantity of seeds in mechanical seed drills increased the seed energy utilization.

For sowing operations both mechanical energy and human energy were considered for operating the machinery in mechanised farms. Tractor energy, implement energy, and fuel energy together constituted 474.34 MJ/ha. Where as the sowing operations in traditionl farms use 294.53 MJ/ha. for bullock energy. 17.67 MJ/ha. for implement energy and 23.02 MJ/ha for human energy. The sowing operation utilised more energy in mechanised farms. This was attributed to the fact that the use of improved farm implements required more energy. For weeding, human energy application was 252.16MJ/ha. and 231.16 MJ/ha respectively, for traditional and mechanised farms. Weeding operation was done manually by both the farms.Human energy used for harvesting and bundling was found to be 572.15MJ/ha. and 561.43 MJ/ha. respectively for traditional and mechanised farms, which again showed variation in energy imput use.

On an average the traditional farms utilised 8103.80 MJ/ha. and the mechanised farms 10246.00 MJ/ha. The energy output-input ratio was found out to know the energy use efficiency between farms of two categories in the study area. The energy output-input ratios for both traditional and mechanised farms were 13.23 and 23.78, respectively, Thus the energy use efficiency was higher in mechanised farms as compared to traditional farms. Even though the input energy was high in mechanised farms, their corresponding increase in output energy showed the relative efficiency of factor inputs in the production process.

Table 2. Activitywise energy use in traditional farms (in mega joules).

Farm Activities	Energy use	Percentage
Field Preparation	469.47	5.79
a. Implement Energy	7.97	
b. Bulock Energy	401.37	
c. Human Energy	60.13	
Farm Yard Manure	6072.19	74.93
Farm Yard Manure Application	29.72	0.37
Seeds	372.91	4.60
Sowing Operation		
a. Human energy	23.02	0.28
b. Covering Seeds with Tractor	312.20	3.85
b.1. Bullock Energy	294.53	
b.2. Implement Energy	17.67	
Human Energy for Weeding operation	252.16	3.11
Human Energy for harvesting, bundling, transporting and threshing	572.13	7.06
Input Energy	8103.80	100.00
Output Energy	107187.25	
Output-Input Ratio	13.23	
Net Returns (in Rs.)	1169.73	

One Mega Joule = 10^6 Joules

CONCLUSION

Introduction of water conservation implements in mechanised farms besides improving the water retaining capacity of the soil increased the yield, which ultimately led to greater output-input ratio when compared to the traditional farming system. The realization of increased output energy in mechanised farms showed the fact that the improved energy input has significantly enhanced the energy input use in crop production system in mechanised farms. Since economic development of a country is closely interlinked with energy use, a deliberate strategy of moving away from dependence on human and animal energy should assume national importance. With India's relative agricultural energy stability shattered by the non availability of cattles during cropping seasons for various agricultural operations, technological advancement of using improved energy gadgets will have to play a very crucial role in reshaping energy policy.

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RESEARCH NOTES

SALT AFFECTED SOILS OF TAMIL NADU

Salt affected soils occur in Tamil Nadu in both coastal and inland areas. While the extent of the coastal salt affected soils has been systamatically delineated by the state soil survey and land use organisation, there is no valid documentation on the extent and nature of these soils in the inland areas. The reason for this is that these soils in small and discontiguous patches not mapped in reconnaissance soil survey which has been completed in the state. This paper details with the nature of some of the salt affected soils of Tamil Nadu. The available soil maps published by the state soil survey and landuse organiation were overviewed for the indications of salt affected areas. The Training and Visit (T&V) divisions of the state department of Agriculture were contacted to obtain information on the locations of salt affected soils in their divisions.

The geographic positions and nature of the soils in some parts of the state were assessed by field visits. Typical pedons were examined. The soil samples collected from four pedons were analysed for textural characterisation and composition of saturation extract according to Richards (1954). The ground water samples