



Determinants of Cropping Pattern in the Semi-arid Zone of Southern Tamilnadu, India

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ABSTRACT

Determination of cropping pattern is essential to decide whether the agriculture is subsistence or sustainable. The present study was conducted to find the cropping pattern and its determinants in the semi-arid zone of southern Tamilnadu (Thirumangalam block, Madurai district). The survey was carried out to know the existing agricultural practices and it was correlated with rainfall, temperature, irrigation facility, market prices and socio-economic conditions of the cultivators. The study revealed that sorghum was suitable crop for rainfed area and paddy was appropriate crop for irrigated area. The Olericulture (vegetable cultivation) had market support and provided promising economic profitability for the farmers of this area.

INTRODUCTION

The Indian subcontinent is bestowed immensely rich land race diversity in major agricultural and horticultural crops, due to native farmer's conscious/unconscious selection inherited and perpetuated over generations. India is known to have more than 17,500 species of higher plants including 168 major and minor crop species and 34 of their wild relatives. Additionally, the native tribes used around 1500 other wild edible plant species. These include 145 species of roots and tubers, 521 of early vegetables, greens, 101 of bulbs and flowers, 47 of fruits and 118 of seeds and nuts. About 44 major or minor species were domesticated in India (Gautam 1998).

In India, rainfed agriculture accounts for over 65% of cropped area (Das 2001). In Tamilnadu 60% of agricultural land was under rainfed condition (Nasureeden & Ramasamy 2002). Due to prevailing socio-economic situations, crop production in India has to be considered by and large a subsistence rather than commercial activity. Cropping systems support primarily to fulfil the household needs of farmers. In order to increase the production potential of rainfed area, efficient crops can be introduced over traditionally grown crops. The substitution of alternate best-adapted crops and following crop rotations will also maintain production risk, insects, weeds and soil fertility.

By understanding the determinants of cropping pattern, it is essential to monitor climatic factors especially rainfall, socio-economic status of cultivators, irrigation facility, market prices and domestic market support. By understanding the importance of agricultural crops and plant parts utilized by people traditionally for various products available in the market and the raw material required for it, we can evaluate a system to grow them in farm lands, wastelands, lakes and river banks. In turn, this will reduce the pressure on the natural forests and thereby conserve the bio-diversity and improve the socio-economics of the rural poor. Hence, the present investigation was carried out with the aim to find out the determinants of existing crop pattern in the study area and to provide suitable cropping system for subsistence to sustainable agriculture.

MATERIALS AND METHODS

The survey was carried out to know the existing agricultural practices in Thirumangalam block in Madurai district of Tamilnadu, which is located at 13.09°N and 80.21°E. It is bounded on the north and east by Thirupparankundram block, on the south by Kallikudi block and on the west by Chellampatti block. It has an average elevation of 142 meters above mean sea level, and temperature ranges from 19.9°C-37.3°C. Average annual precipitation ranges between 750 and 870 mm. The climate is subhumid to semi-arid. Soil is red loamy to black with pH range of 6.5-7.5. Organic content of the soil is 0.50-0.62%. The nitrogen, phosphorus, potassium, calcium and magnesium contents are 0.3-0.4%, 0.07-0.09%, 0.42-0.47%, 0.5-0.7% and 0.18-0.25% respectively (Rajendran et al. 2008).

The information regarding the types of crops cultivated, economic profits and socio-economic status of farmers was collected from the progressive farmers through direct interview method using formal questionnaire. Survey was also carried out in existing agro-forestry plantation. The area allotted for each crop, land use pattern, irrigation facility, rainfall and temperature were also recorded and it was compared with data collected from Agricultural Office at Thirumangalam and Statistical Office in Madurai.

RESULTS AND DISCUSSION

In the semi-arid tropics (SAT) there is a long tradition behind the practice of rainfed agriculture. As a result, the population in these regions has developed ideally adopted agricultural system. Suitable species of plants, livestock and suitable types of equipments are used to permit permanent utilization of available soil and water resources. A large diversity of cropping system exists under rainfed and dry land areas with an overriding practice of intercropping due to greater risks involved in cultivating larger area under a particular crop (Das 2001). The present study was focused on the cropping pattern in relation to climatic factors, especially rainfall, socio-economic status of cultivators, irrigation facility, market prices and domestic market support. The usual cropping pattern of selected area based on rainfall and temperature is represented in Fig. 1. The fluctuations in the price of agricultural products created a state of insecurity among the farmers. Thus the farmers in the study area diversified the cropping pattern to avoid the risk and to get steady income.

Poor soil fertility and low moisture content are the other major factors limiting crop production in arid and semi-arid region. Fodder plants play an important role in the economy of farmers as they constitute the feed of their livestock. The data obtained in the present study revealed that sorghum was given first preference due to its location specific adaptability and short rotation period (Fig. 2). It was mainly cultivated as forage crop for cattle and goat. In general, the sorghum is called

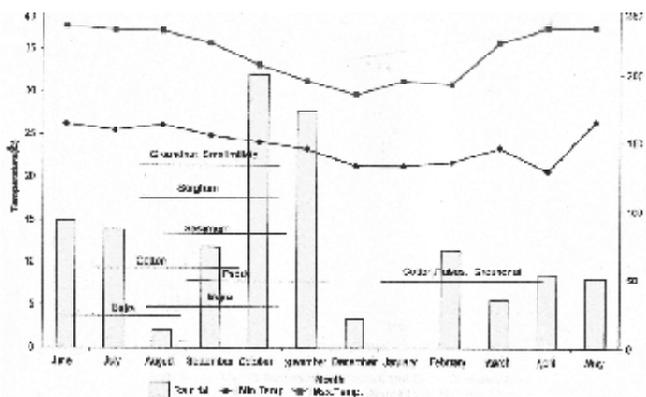


Fig. 1: Temperature, rainfall and usual cropping pattern of Thirumangalam block, Madurai district.

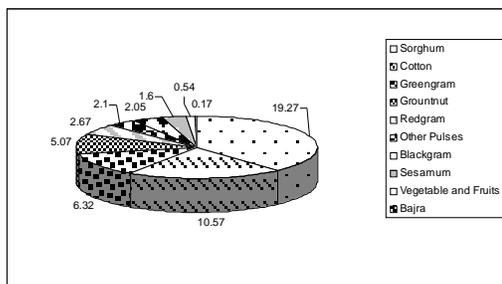


Fig. 2: Area allotted (%) for different crops in rainfed condition.

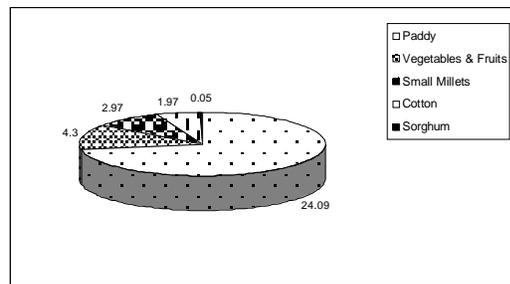


Fig. 3: Area allotted (%) for different crops in irrigated condition.

“crop camel” due to its low water requirement and adaptability to all kinds of soils.

Second preference was given to cotton because it grows well in block cotton soil under dry climatic conditions. Moreover, it has accessible local marketing facility and market support by spinning mills around Thirumangalam in Madurai district. The commonly cultivated varieties of cotton are MCU 45, LRA 5166, MCU 7 and SVPR 1, 2. It was also noted that in Andhra Pradesh, the cotton cultivation follows increasing trend in 1990s due to dry climate and abundance of agricultural labours (Kubo 2005).

The water requirement for the green gram is high (600-1000 mm) and net profit was also less as compared to other crops. One of the reasons for decline of cultivated area for green gram, black gram and pearl millet in Meerut region from 1992 onwards was low economic profitability (Singh et al. 2000). But in the study area it was given third preference to meet the consumption need of local people and to maintain the soil fertility.

Under irrigated area paddy was given first preference (Fig. 3) due to consumption demand of the local people, economic profitability and irrigation facilities. The irrigation sources include 208 canals, 8714 wells and tanks, private tube wells and dug wells. Usually, the medium duration rice variety IR20, Blast disease resistant Co43, ADT 45, ADT43, and Kulsar-ADT39, Chellaponni were planted during November-February.

Second preference was given to horticultural crops such as vegetables and fruits. The commonly cultivated vegetables are brinjal, tomato, snake gourd, bottle gourd, ladies finger and onion. The horticultural crops cover about 9% of the total area contributing about 24.5% of the gross agricultural output in the country (Das 2001). The major reason could be the economic profitability. In the present study also it was revealed that tomato, onion and ladies finger produced 68.2%, 64.6%, and 56.4 % net profit respectively as compared to 55.5 % net profit produced by paddy (Table 1).

Another reason for the selection of horticultural crops was less labour requirement and wages paid for agricultural operations. In the case of plantation crops and horticultural crops, labour requirement is high

Table 1: Economic profitability of various crops (rupees/acre).

S. No.	Crop	Input (Rs.)	Output (Rs.)	Net Profit (%)
1	Paddy	7032	15,760	55.3
2	Groundnut	4370	9625	54.5
3	Bajra	1748	4266	59.0
4	Greengram	2850	4375	34.8
5	Tomato	2500	10,679	68.2
6	Brinjal	9536	20,875	54.3
7	Gourds	2550	4975	42.7
8	Onion	8440	22,120	64.6
9	Ladies finger	3713	8525	56.4

only during the initial stages. Once the crops start yielding, labour is required only for maintenance and harvest (Mahesh 1999). In the present study, it was found that, though the rural population was high (71%), the cultivators who possess own land was just 46.21 % and major part (53.79 %) of them were agricultural labourers. The wages given for different agricultural work were quite meagre. For example, agricultural operations such as irrigation, digging, pruning, manuring, bund making only rupees 80 per day was given to male workers and for plucking and transplanting work rupees 30-40 per day was given to female workers. Moreover, labourers did not get job assurance for all the thirty days in a month. Apart from these reasons, domestic market support by Uzhavarsandai in Madurai favoured Olericulture. Since most of the farmers are marginal farmers (64%), they were not able to afford money for transport charges in addition to production. The government provides separate buses to bring vegetables to Uzhavarsandai without any charges. This reduces one of the big burdens in marketing.

It was interesting to note that other small millets were given third preference under irrigated area. It was due to their drought-resistant ability and their nutritional value. Moreover, the hybrid varieties Kudiraivali Co1, Samai K1, Sanaipaiyur1, Varagu K1, Vamban1 Varagu and Panivaragu Co2 are short duration crops (75-110 days) and suitable for early and late sowing seasons, withstand short period of intermittent drought and tolerant to downey mildew, smut, ergot diseases and pests. Verma (1990) reported that the agro-forestry had been adopted by marginal, small and large farmers in the moderate rainfall zone in Gujarat state. But the present study revealed that there is no scientific and systematic cultivation of agro-forestry in this area. However, teak trees were planted on the bunds of rainfed upland after 1990 only. Neem trees are naturally regenerated and grown in bunds without any silvicultural management. Overall scenario in the sampled villages is that neem was the most popular farm tree which has multiple utility as pesticide, medicine, oil, firewood and timber.

CONCLUSION AND RECOMMENDATIONS

The cultivation of vegetables has more economic profitability as well as market support by Uzhavarsandai in Madurai and surrounding places. Thus, the economic status of farmers of this area can be well enhanced by supporting vegetable cultivation (Olericulture). To sustain the agricultural production and the livelihood of marginal farmers in the semi-arid zones, micro level studies should be conducted for every 5 to 10 years. The choice of crops should be based on evaluation of availability of water sources, consumption demand, market price, rainfall, climate, weeds and pests.

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