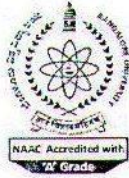




Title	Environment, Agriculture & Food Security in India
Author	Dr. Nyo Nyo
Issue Date	



ENVIRONMENT, AGRICULTURE & FOOD SECURITY IN INDIA

118

(Proceedings of the XXXI IIG Meet)

ISBN-13:978-81-910533-0-2

Edited by

Prof. A.S. Rayamane
Convener-XXXI IIG Meet



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**Physio- Infrastructural Factors Which Influence on
The Multiple Cropping Systems and Crop Diversification Levels Of Khin Oo Township (2004-05)**

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ISBN -13:978-81-910533-0-2

Introduction

Diversification of farm crops refers to the complex diversification patterns of agricultural cropping systems found under the conditions of farming environments. In short, diversification of crops firstly refers to the species of cultivated crops and secondly refers to the diversification of varieties and ecotypes of the same variety to maximize output of primary products as well as value-added processed products to enable farmers to enhance their income. The most important aim of the practice diversification of crops is to increase food production and food security not only for local needs but also to the markets.

The study area has rich in space for agriculture with a favourable climate and soil conditions for the growing of variety of crops all year round. A systematic arrangement of cultivating a variety of crops in rotation with respect to soil and climatic conditions, thereby ensuring a variety of diverse dietary standards and nutritional status of the rural households. Improved crop sequences involving rotation of soil exhausting follows by recuperative ones, shallow rooted crops follows by deep-rotted ones, crops which prefer much moisture content follow by dried crops "Ya" crops (in Myanmar), crops with long growing season follow by shorter ones, legumes in rotation with non-legumes, etc., are envisaged to enrich and maintain soil fertility and crop productivity. In this way, it becomes possible to ensure some degree of constancy in crop production, by destabilizing many of the limits and a biotic stresses.

Study Area

Khin Oo township is located between 22° 30' N and 23° 00' N latitudes and 95° 15' E and 96° 06' E longitude. It covers an area of 400.82 square miles (2,56,526 acres). It consist of 4 wards and 59 village tracts (Fig – 1). Khin Oo township lies within the Central Basin of Myanmar. Topographically, it can be divided into western plain and eastern low range of hill. The relief has lowered from east portion towards the west, and the average altitude of the eastern portion is about 500 feet, and the western part is about 250 feet above MSL. The main rivers which pass through the township are Ayeyarwady and Mu, and other important streams are Khetlan and Mutain. Although Ayeyarwady river serves as the eastern boundary of the study area, supply of water cannot be expected due to the high topography of the eastern portion of Khin Oo township. Only from Mu River, water can be supplied for agriculture. Climatically, it is suffered from BWh type. The average temperature is about 89° F. It receives an annual rainfall of less than 40 inches. In Khin Oo township, 5 major soil types as shown in Fig. (2) are found, and this is one of the dominant effects on agriculture in the township.

Objectives

The main objectives of the paper are,

- i. To understand the impact of physical and socio-economic conditions on the agricultural mosaic; To know the contemporary competition amongst crops grown in the study area; and
- ii. To plot the spatial distribution of levels of crop diversification in Khin Oo township for the year of 2004-05.

Data Base and Methodology

Secondary data regarding with the sown acreages of various crop was collected for the period of 2004-05 from the Myanmar Agriculture Service and Land Records Department in Khin Oo township.

Based on the variable data, the indices of crop diversification for 60 village tracts were calculated by using Gibbs and Martin's method. The method is as follows :

$$\text{Index of crop diversification} = 1 - \frac{\sum x^2}{(\sum x)^2}$$

x = sown acreage under an individual crop.

It may be inferred that greater the value of index, higher is the degree of crop diversification. In the study area, the values of diversification indices varied between 0.27 and 0.87.

Discussion and Results

In Khin Oo township, the various crops which cultivated during 2004-05 varies up to 22. For easy calculation and analysis of simple distribution, those types of crop were compiled into 18. The major crops were paddy, green gram, pigeon pea, other pulses and groundnut.

According to the available data and applied statistical method, 3 groups of crop diversification indices have been observed in Khin Oo township (i.e., high, medium and low) in Fig. 3. Those levels were worked out by using the values of mean and standard deviation for 60 village tracts.

Moreover, the multiple cropping systems of the study area for the period of 2004-05 were plotted in figure 4 to be more prominent to the agricultural situation of the study area.

High Level of Crop Diversification

During 2004-05, there were 37 village tracts which fell under the level of high category. It can be clearly seen that, the high level was dominated in the western and eastern portions of the township (fig. 3). Although the eastern part of the township is located on the high topography therefore we can not expect water for irrigation. The influenced soil type i.e., red brown savanna allows to grow various "Ya" crops especially for groundnut. Number of crops can be grown even with the less amount of moisture content or rainfall in this area. Hence, the village tracts within the eastern portion of township were found in the high class.

The western portion of the township is occupied by meadow and meadow alluvial soils. Those types of soil are suitable for growing paddy and other "Le" crops (wet cultivation). Moreover, other advantage of this portion has been sufficient supply of water from Mu river by canals. Due to the sufficient supply of water, various crops especially both types of paddy were grown successfully. Thus, it also can be found under high category.

Medium Level of Crop Diversification

There were 13 village tracts under this class in 2004-05. The dominant soil type in those village tracts is suitable for paddy cultivation, but it is necessary to add fertilizer. Besides, the supply water could not reach on time for crop cultivation, because those village tracts lie at the tail of supply of water canals. Thus, the index of diversification can be observed as medium level.

Low Level of Crop Diversification

Only 10 village tracts were under this category for the year of 2004-05 in Khin Oo township. Due to urban characteristics, the wards of Khin Oo town were under this class. In the remaining village tracts, the drawback was insufficient supply of water and size of land holdings, although the soil types can permit to grow number of crops. For example, the Indiangyi village tract lies on the bank of Mu river and it is occupied mostly by meadow alluvial soil, but the diversification level was in low class due to the size of land holdings.

Multiple Cropping Patterns

In the study area, the major crops were both types of paddy, green gram, pigeon pea, groundnut and other pulses. Fig (4) shows the multiple cropping pattern of 60 village tracts for main crops. In this figure, triple cropping (including mixed crops) systems are not taken into account and it will not affect in the discussion in the paper, since the area of triple cropping systems is not large. The cropping systems for the study are during 2004-05 can be classified into 10 groups and they are as follows :

1. Zone of single cropping (monsoon paddy).
2. Zone of double paddy cropping (monsoon and summer paddy).
3. Zone of green gram and groundnut cropping,
4. Zone of monsoon paddy and other pulses cropping,
5. Zone of monsoon paddy and groundnut cropping.
6. Zone of monsoon paddy and vegetables cropping,
7. Zone of monsoon paddy and green gram cropping,
8. Zone of groundnut and other pulses cropping,
9. Zone of groundnut and pigeon pea cropping, and
10. Zone of green gram and vegetables cropping.

Paddy is cultivated mostly during rainy season. Due to the study area lies in the Dry Zone of Central Myanmar the summer paddy can be raised successfully in the village tracts where the supply water is available. Among the oil seed crops, groundnut is grown throughout the township. The last 3 systems were found only in a single village tract each. Due to the growing season of paddy is relatively long lasting; most of the second crops were other pulses and groundnut.

It can be observed that the cropping patterns of paddy dominated, and green gram and groundnut dominated were more or less coincided with the high level of diversification for the year 2004-05. Hence, it is seemed that the same factors of physiographic and infrastructure also influenced on the cropping patterns.

Conclusion and Proposal

The index of diversification provides a method for generalizing the relationship between the relative strength and the numbers of crops grow. Generally, it is seemed that the most influenced factors for the diversification of crop in Kin Oo township were topography, types of soil and irrigation facilities. Moreover, the size of land holdings and the attitudes of farmers might affect on the diversification levels. Because, the land holdings which belong to the farmers from the village tracts of eastern part of township are more than 50 acres.

In the study area, the farmers want to grow diversified crops, because

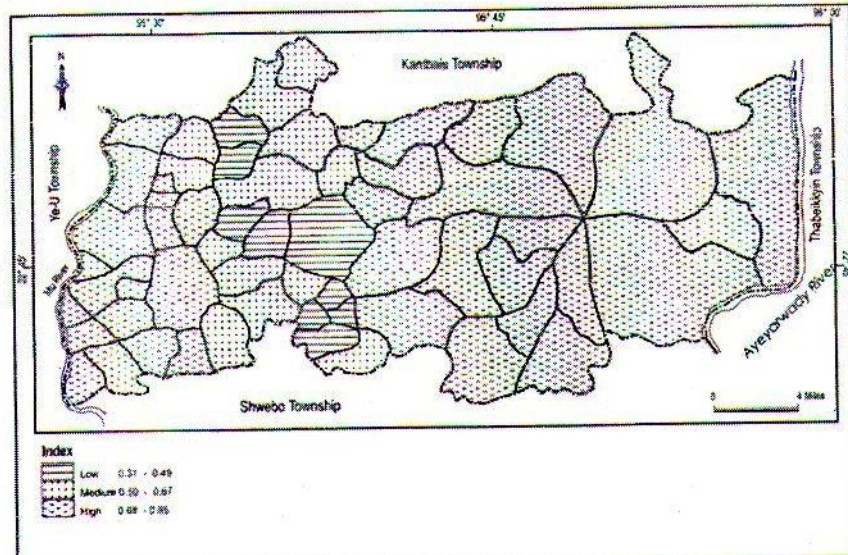
1. They want to achieve self-sufficiency in food crop production in a sustainable manner by improving the productivity on a short and medium term basis,
2. They want to attain self-reliance in the long term,
3. They want to enhance their income through the production of high-value crops, and
4. They refer to maintain a better soil structure for long term sustainability.

The regional dominance of some crops in the study area does have some relationship with other crops, indicating a strong bearing on the degree of crop diversification or specialization. When most of the areas are endowed more or less with the conditions of sufficient supply water, types of soil, characteristics of rainfall and the site of the arable land, etc., crop diversification appears to be the maximum. If it does so, it may lead to the agricultural development.

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SPATIAL DISTRIBUTION OF CROP DIVERSIFICATION LEVELS IN KHIN-OO TOWNSHIP (2004 - 05)



Source : Land Records Department, Khin Oo Township.

MULTIPLE CROPPING SYSTEMS OF KHIN GO TOWNSHIP (2004-05)

Fig. (4)

