CHAPTER - 2

PROBLEMS AND PROSPECTS
2.1. Introduction

Meghalaya is an agricultural state. About 80 per cent of the potential working population are engaged in agricultural activities. Although the land-population ratio is very large (59 persons per square kilometre according to 1981 population figure), unfortunately, only 15% of the land is useful for any type of the cultivation with the prevailing agricultural technology and another 8% of the total land area is covered by forests. It could, therefore, be said that from agricultural point of view the population density is 74 persons per square kilometre.

The topography of the land provides scope for a variety of agricultural crops ranging from cereal, e.g. rice, maize and millets to various fruits which are grown in the state. The major crops grown by the farmers are paddy, potato, maize, cabbage, cauliflower, turmeric, ginger, short staple, cotton, black pepper etc.

In Meghalaya, there is a peculiar land tenure system. It is different from that of the plains area in the north east, where majority are non-tribals. The Garos, the Khasis, and the Jaintias have more or less a similar land tenure system. Here, in Meghalaya, the laws relating
to the land tenure system and its accompanying ownership are primarily customary laws. According to the Meghalayan land tenure system, land may be classified into three categories signifying pattern of ownerships - these are

1) Community land;
2) Private land;
3) Government land.

2.2.1. **Community Land**

Under this category, land belongs to the community. Community land is known as **Ri Raid**, where **Raid** means community. According to the Report of Land Reform Commission for Khasi Hills (1974), every member of the community has the 'use' right and 'occupancy' right over land. No one has to pay land revenue in kind of cash for enjoying his rights. If anyone has to pay any amount, then it is generally for the improvement which the community would have made on the land or for services rendered in its use as occupant for cultivation. No person belonging to the community can be debarred from occupying any vacant plot of land. Similarly, no one can claim for more land than what he can actually cultivate. If a person vacates or does not make use of the land under his actual occupation for three consecutive years, the land reverts to the community (Mathew, ). Generally, there is no proprietory, heritable or transferable right on
the Ri Raid land. However, a person can acquire transferable right on the Ri Raid land, if he had made permanent improvement on it. The form of permanent improvement implies, e.g. cultivation of permanent crops and plants, fish pond, permanent building, etc.

Community land may be divided into forest land and non-forest land. There are mainly three kinds of forest land: a) land reserved for religious purposes; b) land reserved by the community; c) private land (Nair, 1983).

2.2.2. Private Land

Private land, which is known as Ri Kynti, is mostly divided into two categories. That is, a) ancestral and b) self-acquired.

The 'durbar-kur' (assembly of the clan) has control over the former, the person who has acquired it has full control over the latter. However, the 'self-acquired' land would be considered as an ancestral property when it passes to the children of the one who has acquired it, and then presumably it would be subjected to the jurisdiction of the 'durbar' (Mathew, 1981).

The states has no control over the Ri Kynti lands. Every individual can enjoy all the rights over their land.
The landed property may be of ancestral or purchased type. Ka Khadduh (youngest daughter of the family) gets larger share of land than the others. If the family does not have any daughter, then the family brings a Ka Khadduh from the sister's family, immediately elder to the mother. In absence of them, the family prefers 'a cousin' daughter of the mother's side (Mathew, 1981). This is how hereditary rights are preserved.

2.3.3. Government Land

Government land are those lands on which Government acquires ownership and gets the authority of control and management over the land.

The Land Reforms Commission for Khasi Hills, states that the British Government and the Indian Government have taken land in the Khasi Hills under various rules issued from time to time. Till today, the government have taken land on the basis of exchange, lease, purchase and of acquisition. According to the related rules the government enjoys all the rights over land.

2.3. Types of Soil

Soil of the North Eastern Region, specially the hilly areas is juxtaposed by many types of rocks.
This is among others, due to the variation of rainfall of this region. Monsoon starts generally during the month of May and continues till September, and rainfall varies from 1000 to 4450 mm. The soil reaction varies from 'strongly acidic' to 'acidic' in nature.

The soil scientists classified land in Meghalaya into the following categories (Rajan and Rao, 1981).

Table 1

<table>
<thead>
<tr>
<th>Soils classification unit (Traditional or popular nomenclature)</th>
<th>Equivalent name according to the 7th approximation classification</th>
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<tbody>
<tr>
<td>(1) Red loamy soils:</td>
<td>i) Paleustalfs</td>
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<td></td>
<td>ii) Phodustalfs</td>
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<td></td>
<td>iii) Halplustalfs</td>
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<td>(2) Red and yellow soils:</td>
<td>i) Haplustults</td>
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<td></td>
<td>ii) Ochraquults</td>
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<td></td>
<td>iii) Rhodustults</td>
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<td>(3) Lalerite soils:</td>
<td>i) Plinthaquults</td>
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<td></td>
<td>ii) Plinthustults</td>
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<td>iii) Plinthudults</td>
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<td></td>
<td>iv) Oxisole</td>
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<tr>
<td>(4) Brown hill soils:</td>
<td>i) Palehumults</td>
</tr>
<tr>
<td>(on sandstone and shales)</td>
<td></td>
</tr>
<tr>
<td>(5) Old alluvial soils:</td>
<td>i) Paheustalfs</td>
</tr>
<tr>
<td></td>
<td>ii) Haplaquents</td>
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<tr>
<td>(6) Terai soils:</td>
<td>i) Haplaquollis</td>
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<tr>
<td>(7) Alluvial soils (recent):</td>
<td>i) Haplaquents</td>
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<td></td>
<td>ii) Udifluuents</td>
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2.4. Problems Associated with the Use of Fertilizer

We shall briefly present the Indian picture first. Since at the initial stage of development, social, psychological and economic constraints may not be similar. Nevertheless, these constraints play a vital role as against the adoption of new techniques or means of production as in any other parts of the country, specially hill areas.

Organic fertilizer is important as they are used to improve the fertility of the soil as well as to keep the soil moist. But it is to be noted here that organic fertilizer is not enough for the production where it cannot possibly meet the full requirement for replenishing the soils for frequent use for cultivation and/or at higher level of production.

On the other hand, chemical fertilizer plays an important role in any scheme for boosting up the agricultural output. Chemical fertilizer consists of Nitrogen (N), Phosphorous (P₂O₅), and Potassium (K₂O) compound.

N.S. Shetty explains in a study that the use of fertilizers can be measured in three different ways (Shetty, 1969):

a) Total weight of different types of fertilizers used by the farmers.
b) Total weight of plant nutrients contained in different types of fertilizers need by the farmers.

c) Aggregated weight of plant nutrients contained in different types of fertilizers used by the farmers, where weight being assigned on the basis of soil text data of a particular region.

The first measure appears to be improbable, since construction of an index of use of fertilizers in terms of recommended doses vis-a-vis in terms of plant nutrients, needs a controlled agricultural operation.

In order to have a meaningful analysis of reaction of 3 types of nutrients, relating to soil, plant, and manure, independently of one nutrient from other and the synergic effect of all, plus: the extraneous variables as temperature and rainfall, requies an elaborate methodology and that is to be done in a controlled situation.

It is found that a very few farmers used fertilizer more than half of the recommended doses. There is a seasonal variations in the use of fertilizer also (Borah, 1981). This may be due to number of reasons.

In a study by Nagaraj has shown a definite acceleration in aggregate fertilizer consumption, since the mid-sixties.
According to him, the acceleration is mainly due to slackening of demand. Nagaraj found that the consumption of fertilizers has consistently been falling short of the required target, since 1961-62. This is caused by any or all of three factors, that is, (i) supply constraint, (ii) absence of an efficient distribution network and (iii) deficiency of demand. Moreover, one of the principal reasons for non-fulfillment of agricultural production targets is the wide and increasing gap between the target and actual levels of fertilizers use.

There are certain factors affecting fertilizer demand too, they are, fertilizer price, acreage, farm income, capital, interest rates, education, experience, distance from town etc. These exogeneous variables divided into two broad categories: a) Economic variable, that is, size of the farm, irrigation facilities, farm and non-farm income, liquidity, availability of supplies and credit, profitability of change, attitude towards risks, price stabilization etc. b) Sociological and demographic variables, i.e., caste, education, age and contact with extension agencies.

Size of holding is covered by two variables: a) area of owned holding; and b) cultivation holding (Nagaraj, 1982).
In a study, sponsored by the Department of Agriculture of the Government of Assam carried out by Agro-Economic Research Centre, found that the factors influencing the use of fertilizers are: 1) location, 2) literacy, 3) economic condition of the farmer, 4) size of holding, 5) types of tenancy, 6) irrigation facilities, 7) distribution of fertilizer, 8) price of fertilizer, 9) marketing prospects of agricultural products, 10) technical guidance, 11) storage facility, 12) practice of HYV cultivation and 13) pesticides. However, this study is more exploratory and analytic. The study does not reveal which of these factors has a far bearing consequence or what drawbacks for the use of fertilizer be removed in precedence (Borah, 1981, Shetty, 1969, Vipin Chandram, 1982).

Illiteracy may be considered to be primarily responsible for rural poverty, though a programme for literacy driver has a long time lag to produce economic result, nevertheless, the ignorance and communication gap between the farmers and the agricultural extension workers constitute a major hindrance in improving practice of agriculture and for that matter the rational use of fertilizer.
Since not so recent past, the use of chemical fertilizer has increased in our country in order to boost up agricultural production. Unfortunately, due to some reasons the primary step to test soil was not always carried out. So without knowing the nutritional standard of the soil, fertilizer may not yield the assumed positive result. Soil testing plays an important role of the "package and practice" of agriculture. The fertilizer recommendation depends on the fertility status of the soil along with other factors like slope gradient, plant variety, irrigation facility, climate, etc. In this matter, the extension workers as well as the Block Development officials have important role to play through their acting and co-operation in rendering the soil testing services available to the farmers. The basic objective is to guide the farmers for better economic use of soil-nutrient and other inputs.

Although India is an agricultural country, the conditions governing the agricultural operation in different parts of the country vary and these variations are not only inter-regional but also intra-regional. The so called green revolution can be felt in certain packets of the country, and it has not been able to make any headway even in a
conceivable significant way in other parts of the country. The modern agricultural technology, inclusive of the seed-fertilizers combinations, has also met with varying degree of receptions in different corners of the country. Thus, it is but natural that a single well defined all-comprehensive and all-pervasive 'model' or formalization regarding the factor governing the pattern of demand for agricultural inputs, viz. fertilizer is hard to find which could be applied throughout the length and breadth of the country. We have studies on particular districts of a state or a region. However, they too provide us with important materials for our purpose.

Another fertilizer demand model used by Timmer, based on profit maximizing behaviour of the farmer and knowledge of relevance of a single price of fertilizer in the market. It has considered both the short-term and long-term factors affecting the demand for fertilizers by the farmers. Following are the variables taken into account by Timmer: fertility price, crop price, acreage, farm income, capital assets, interest rates, education, experience, distance from town, time etc. (Timmen, 1974).

In this model, it is not only the demand for fertilizer, but also the supply of agricultural output that
is to be induced for long-term analysis. If farmers can get more output, it leads to a decline in the prices of output. It, therefore, has a damaging effect on the farm income. He observes that, with the less income, farmers may not be able to afford to buy more fertilizers resulting in induced decrease in demand for fertilizer. Therefore, to keep up the growth in income a balance between demand and supply has to be maintained. This is necessary even for steady growth of income of farmer.

This model is an aggregative model and considers both the short run and long run situations. In the short run, price responsiveness of demand for fertilizer is higher than that in the long run. The phenomenon is, however, explained by farmers' adjustment to new prices. The only mechanism in the model why equilibrium can be maintained in the product market, when consumer demand changes, is through fertilizer-induced changes in supply. If consumption demand for fertilizers will not change. The mechanism is that foodgrain price must rise to whatever level is necessary to call forth the additional fertilizers application. A supply shortage that decreases fertilizer demand because of higher prices will have as its longer run effect an increase in the price of foodgrains that will call
forth additional fertilizer applications.

We can also question the assumption of profit maximisation, perfect knowledge etc. of the farmers. As we all know that, these are important characteristics of market economy. As pointed out earlier the price variable is taken to cover all these features. It would be simply repetition to state the assumptions of the market economy do not fit in to the agrarian condition in most of the underdeveloped and the developing countries. It was pointed out by many researchers that socio-economic conditions over-ride all the equilibrium conditions both necessary and sufficient, yet, it must not be construed that price is insensitive to demand and supply even in a less sophisticated sector like Agriculture. In this context, the work by Krishna Bharadwaj is very explicit. She points out the peculiar features of the agrarian economy and explains why competitive market conditions cannot make much sense in describing the rural economy.

These peculiar features include the varied (non-uniform) "extent and type of involvement in the market of the different sections of the peasantry". "Local pattern of power" reflected in the 'relative' 'bargaining strength' (reinforced by forces of traditions, customs, social-moral)
of different sections of the rural people, different access to resources the terms on which they can be obtained and the fields of feasible choices open to the individual producer in the various markets (Bharadwaj, 1980).

Therefore, we have the rural economy not the usual inter-linked markets of the competitive framework, but a system of interlocked markets which increase the exploitative power of the stronger sections. May be her findings are typical of rural agricultural economy even in regions of north-east.

Fertilizer is one of the most important inputs to increase the output level. But most of the rural farmers are not keen using of fertilizers. Through a Sample Survey for 1975-76 and 1976-77, NCAER has shown the reasons why farmers are not using fertilizers.

The most important reasons for not using fertilizer is non-availability of irrigation system. It varies from state to state, depending on the availability of water and higher exploitation. Sometimes, the pattern of irrigation is not uniform. This reason can be considered as a physical constraint. Secondly, rural small and marginal farmers are
not using fertilizer due to unawareness of their use and some of them believe its use to be more harmful. Also there are some steps where the large farmers are sometimes ignorant of the use of fertilizers. Thirdly, some farmers cannot use it due to the lack of capital. Credit also is not available to them and it is the most important reason presently. Fourthly, the supply of fertilizer is not available to the farmer, and they cannot use it at the right time.

Here, we should discuss the importance of fertilizer in the context of modern technology, since, it is unavoidable in agriculture.

Improved quality of seeds is essential for increasing the agricultural output along with fertilizer. Without the best qualities of seeds, farmer cannot get good result out of their input.

During the mid-sixties, the High Yielding Varieties (HYV) of wheat were introduced to the farmers. Since then, a number of HYV seeds of wheat, paddy and other cereals have been developed and distributed throughout the country. * ... in 1966-67 only 1.88 million hectare of land has been brought under HYV seed; in 1978-79,
10 million hectares of land have been estimated to be covered by the HYV seeds programmes, i.e. the use of HYV seeds has multiplied by about twenty times in a short span". (Dhingra, 1981).

Organic manure was the traditional source of plant nutrient in India. Dhua, in a study, named 'Organic Mineral Fertilizers', says that there are four to five sources of organic fertilizers, that is (Dhua, 1975):

i) Urban compost;
ii) Rural compost;
iii) Cattledung and gobar gas plant;
iv) Urban sewage and sullage utilization;
v) Miscellaneous sources, like - slaughter house, plant resides, habitation wastes, farm wastes, etc.

On the other hand, chemical fertilizer is introduced from the beginning of the first five year plan, in our country. But with the application of primitive technology and low yielding varieties, the consumption of chemical fertilizer was very slow. After the evolution of HYV seeds, fertilizer consumption is increased from the year 1960 onwards, after the introduction of HYV of wheat, paddy and other cereals. In an article, named "Technological
change in agricultural output, about the consumption of fertilizer, which we can see in Table below.

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<tbody>
<tr>
<td>Quantity (Unit mtr. ton)</td>
<td>0.13</td>
<td>0.29</td>
<td>1.10</td>
<td>2.2</td>
<td>5.12</td>
<td>6.2</td>
</tr>
</tbody>
</table>


During the Sixth Plan, importance has been given to the need for fertilizers consumption and production, and to make fertilizer available to the farmers at reasonable price at the right time.

Water is another important input of the package of new technology along with HYV seed and fertilizer. Most of the Indian small and marginal farmers will have to depend on monsoon due to the non-availability of irrigation system. But rainfall is mostly confined to certain states in our country and the worst of all is that there are great variation from
year to year and not at right time of sowing. Therefore, there is an increased need of water through proper irrigation system (Dhawan, 1973).

In India, there are no proper HYV seeds for the higher altitude ranges. In these places, still primitive types of cultivation is practised with traditional local varieties. The essential co-ordinating system like crop management, water management etc. are inadequate. Modern implements for agriculture is unknown to the farmers. Irrigation system practised by the Meghalayan farmers is also very primitive. The most common irrigation system throughout the region is continuous flow irrigation of rice fields with the help of hollowed bamboo connected to a source of water in the hill tops, when such source is available. But it is operative mostly during monsoon.

An important aspect of agriculture in the hill areas of the North-Eastern Region of India is that the majority of the rural population is engaged in jhum cultivation, which is known as shifting cultivation.

For the jhum cultivation, land is selected during December-January by the village elders or community from the forest and jungles depending upon the fertility of the soil (Mathew, 1981).
The main crop grown in the hill are potato, cotton, tapioca, chillies, paddy, millets, beans, sweet potatoes. These are grown as a pattern of mixed cropping. Hill paddy is now being planted as a separate crop. The same jhum area is cropped for the period of two or three years at a time, depending upon its fertility. So after the land is abandoned, new sites are selected for the next cycle of jhuming.

In the hilly regions, where jhum cultivation is practised, the need of applying manures is not always appreciated, as a matter of practice. Jhum cultivation depend mainly on the natural fertility of the soil.

But in Meghalaya, organic manures like cow dung, pig dung, and bonemeal etc. have become very popular among the farmers from a long time. The problems for use of chemical fertilizers are many, the price of fertilizer is not the only constraint. The constraints are mainly the lack of perennial irrigation facility, transportation problem and marketing of agricultural products.

Meghalaya alone cannot be singled out for the infra-structural lag for adopting more productive agricultural techniques. This is the case with the entire North-
Eastern Region (Nag, 1983). The small and medium size irrigation is yet to gather momentum, although every year an equitable amount of money is spent on this heading. Under surface water the ultimate potential has been estimated at 85,000 hectares of which, only 1900 hectares so far has been brought under irrigation upto 1980-81. Actual expenditure during 1978-79 was Rs. 63 lakhs and approved outlay for 1980-81 was Rs. 85 lakhs with target of irrigation for another 2300 hectares. By the end of the Sixth Plan it was envisaged that another 16,500 hectares will be brought under irrigation.

The use of chemical fertilizers mostly confined to potato growing area of the state. According to government statistics about 90 percent of fertilizer consumed in the State is used only for growing potatoes. The following table gives the trend of fertilizer consumption in the State (Directorate of Agriculture, Meghalaya, 1982).

<table>
<thead>
<tr>
<th>Year</th>
<th>Nitrogenous</th>
<th>Phosphatic</th>
<th>Potassic</th>
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<tbody>
<tr>
<td>1970-71</td>
<td>.54</td>
<td>.68</td>
<td>.08</td>
</tr>
<tr>
<td>1974-75</td>
<td>.90</td>
<td>.40</td>
<td>.05</td>
</tr>
<tr>
<td>1979-80</td>
<td>1.23</td>
<td>.68</td>
<td>.09</td>
</tr>
</tbody>
</table>

Unit in thousand tons.
The anticipated target for consumption is 9000 tons of chemical fertilizer of 5000 nitrogenous, 3000 phosphate and 1000 ton potassium in the year 1984-85.

Similarly the consumption pesticides is also negligible, its consumption is also limited to only potato crops. The appointment consumption of pesticide during the period from 1977-1981 is on the average of 25 metric tons.

There is every likelihood that the future for significant achievement in agriculture technology would likewise enhance the trend of fertilizer consumption. Nearly 48% of total Sixth Plan outlay i.e. Rs. 600 lakhs was for minor irrigation, taking into account of unit cost for irrigating 1 hectare of land and keeping in view of inflation about 25,000 hectares of land are expected to be already irrigated by 1983. Unfortunately, we could not get this data.