Introduction:

Agricultural practices followed by the sampled households were traditional and hence investment was on traditional inputs. Although higher investments generally accelerate growth, higher investments in traditional inputs unless it is accompanied by certain modern inputs to improve the technology, cannot generate growth at a rapid rate because of their inherent limitations.

It was observed that the effect of the level of income on investment was more than that of the size of operational area. However the level of

1. Poston (1964) has maintained that in traditional agriculture it is not impossible to raise output by using traditional inputs but the main problem with the traditional inputs is that there is a limit on the level of attainable output per head - which in itself is very low. The limit resulted from the fact that the potentialities which flow from modern science and technology are either not available or not regularly and systematically applied.
income (both farm business income and total household income) in absolute terms was directly related (with an exception in the level of total household income of the lowest size-group of operational holding due to higher non-agricultural income) to the size of operational area. But the pattern of investment essentially remained traditional, representing a backward technology, irrespective of the level of income and/or the size of operational area.

The crux of the problem, therefore, is to identify the internal and external constraints linked with the different size-groups of farms, that are primarily responsible for inhibiting highly productive non-traditional investments conducive to technological development. Constraints such as farm-size, farm business income, cropping pattern etc., which are related to (within the broad limitations) particular size-group or groups may be termed as internal constraints, while constraints arising out of lack of irrigation facilities, problems of flood and waterlogging, non-availability of institutional credit, inadequate extension and marketing facilities, low level of education etc., which affect equally all farms irrespective of their sizes may be termed as
external constraints, of course, these constraints are not completely independent of each other.

**farm size:**

About 47 per cent of sampled households operated on farms below 2 hectares constituting 22 per cent of the total operational area. They carried on agricultural production on uneconomic holdings with many disadvantages. These households had surplus labour. The availability of adult population per hectare of net cultivated area was more than 2.0 in these households while average for all the 215 households was only 1.3. Also it was observed in chapter 1 that per hectare capital investment of these households was higher than households with large operational holdings. Again from the standpoint of farm business income, these households earned below Rs. 4000.00 which was much below the level of minimum family expenditures per annum. Another disadvantage faced by these households was the higher intensity of fragmentation of holdings. The average intensity of fragmentation per hectare for the sampled households in aggregate was 1.4. But in operational holdings below 2 hectares the corresponding figure was 2.4 or more. With all these disadvantages it was obviously difficult for these households to venture upon investment in new technology.
on the other hand 53 per cent households operated 78 per cent of total operational area. It may be argued that a greater proportion of operational area was held in economic units above the farm-size of 2 hectares and as such the constraint of size to productive investment is not tenable. But these farmers faced with different types of problems. Generally, farmers with larger size of operational holdings preferred labour substituting inputs. For example, it was found that farmers operating land above 4 hectares spent Rs. 5970.00 on hiring tractors out of a total of Rs. 6910.00 on the item for the entire sample. But these inputs were also not sufficiently available at easy terms. Facilities for hiring of tractors was available to farmers in 4 sampled villages only. Non-availability of such services in other villages led the farmers to invest in traditional inputs. Again hiring labour was found to be cheaper in comparison to the prices of modern labour-saving inputs. Moreover, the existence of share-cropping tenancy under which the tenant could

2. It was found that during 1974-75 the cost of a 14 h.p. tractor was more than Rs. 40,000.00 and that of 30 h.p. tractor was more than Rs. 60,000.00. A Japanese Power tiller costed Rs. 12,000.00 or more.
command only 50 per cent of the produce helped the big land holders to realise easy returns on land.

32 per cent of total leased out area was under share-cropping system of tenure.

New technology is taken to be scale neutral.

The extent to which the neutrality of scale may continue remains an "unresolved empirical question" (U. T. I. 1976: Part 1:435). But it should also be admitted that technology is not totally unconcerned with the size of operational holdings. For the small sized farms with high man/land ratio a land saving technology is preferable. Such a technology on one hand can do away with the uneconomic nature of size and on the other hand it provides the scope for fuller utilization of labour and capital. Large farms with low man/land ratio generally prefer labour saving technology, at least at the initial stage. Under the existing agrarian structure with skewed distribution of land holdings the preferences of the farmers with different sizes of operational holding commonly vary. Farm size, therefore, gives rise to certain problems in respect of provision of technology acceptable to all categories of farmers.
level of income:

About 71 per cent of households earned an income from farm business below Rs. 5000.00. Also about 70 per cent of their total income accrued from cultivation of crops and sources allied to agriculture. Thus these households did not command any investible surplus in the real sense of the term. Whatever they invested was at the cost either of their current consumption or of certain assets (generally by mortgaging land). These situations either affected adversely their standard of living or reduced their land base. Under such circumstances if for certain reasons their income was increased, it was very natural and reasonable that their preference would go either to raise the standard of living or to increase the land base. From the standpoint of total household income from all sources it was also found that 47 per cent of households earned below the level of Rs. 5000.00. With such a low level of income the farmers have little surplus fund for investment and also for bearing the uncertainty of returns on new investments.
in course of analysis in Chapter 1., it was observed that higher levels of income led to investment for widening the resource base (e.g. the purchase of land) and wider resource base raised investment in current inputs. The relationship was significant throughout the whole investment programme of the sampled households. As the investment for widening the resource base was on traditional capital the investment on current inputs also remained traditional. Further it was observed that owned funds were the main sources of investments.

For higher and better investment in agriculture, farmers are faced with the problems of (i) low level of income and (ii) choice of productive capital. The primary constraints to raising the level of income were that (a) the major sources of income (i.e. cultivation of crops and other sources allied to agriculture) were not found to be adequately remunerative and (b) other sources (mainly non-agricultural sources) of income were not sufficiently available in the rural surroundings of the sampled villages. The other constraint of investing the income in more productive capital mainly originated from the lack of productive investment opportunities.
The creation of these opportunities were beyond the capacity of the farmers under the existing circumstances.

The farmers with large-size operational holdings and with a level of income above Rs. 5000.00, no doubt, had a wide and stable land base as well as commanded an investible surplus. But because of non-availability of modern inputs, a tradition bound outlook and lack of entrepreneurship, their investment pattern remained traditional. Their traditional pattern of long term investment (i.e. capital investment) in turn narrowed down the scope for more productive short term investment (i.e. investment in highly productive current inputs).

Crop pattern and intensity of cropping:

It was observed in Chapter VII that 34 per cent of gross cropped area of the sampled households was devoted to the production of food crops. It was as high as 38 per cent in size-groups below 2 hectares of farm-size. The production of food crops was dominated by the production of cereals, more particularly by the production of paddy. Concentration in production of a single crop had the drawback that in the event of failure the farmers had to face the problem of food shortage. As a result they had to
spend the part of income in procuring food which otherwise could have been invested for higher production. It was more true with the farmers in lower size-groups of operational holdings.

It was absurd that the sampled farmers generally meant by double cropping the cultivation of autumn Paddy (Ahu Paddy). It was also noticed that they had little knowledge of other possible rotations than the traditional crop rotations followed for generations.

The intensity of cropping was higher with lower size-group of farms because these farms had more labour. But a significant point to notice was that the proportion of households having double cropped area was lower with lower size-group. It might have been due to shortage of capital like draught animal. Another possible reason was that they preferred other occupations (like casual labour) from which immediate cash earnings are possible in the winter months, than growing other crops for which long period is necessary.

The intensity of cropping was low and the proportion of households having double cropped area
was higher with higher size-group, primarily due to the fact that these households depended more on hired labour. Another reason was that for certain difficulties like non-availability of irrigation, fragmentation of holdings, it became difficult to grow a second crop in full scale. The farmers had to provide enclosures to protect the crops from stray cattle. Further there was the problem of birds and pests. On the other hand due to low value of the second crop (particularly in Paddy) the cost of cultivation was proportionately higher. As a result the multiple farm enterprise became less profitable to the farmers.

irrigation:

It was reported by the farmers that due to lack of irrigation facilities they had faced certain difficulties in the cultivation of a second crop. Only about 4 per cent of total operational area in the sampled households enjoyed irrigation facilities of seasonal nature. During the winter months the soil gets dry and hard because of the clayey texture of new alluvium soil of the sampled villages. The seasonal distribution of rainfall and rainy days of the district are such that the bulk of the precipitation occurs during the monsoon months and the rest of year is
comparatively dry. There is thus surplus of water during monsoon and the soil remains fully saturated with water. But during the rest of the year the precipitation effectiveness is very poor for high rate of evaporation and the soil dries up very rapidly. This necessitates artificial supply of water for crop cultivation (Borthakur, 1965:30).

The insufficiency of water and uncertainty of rainfall made the cultivators less enthusiastic in the cultivation of second and third crops.

Lack of irrigation facilities was one of the main constraints to investment. The non-availability of irrigation facilities not only lowered the intensity of cropping but also the cultivation of a single crop was made exclusively dependent on rain water and thus exposed to the vagaries of nature. Further the \ldots\ldots \ldots Programme has not succeed much due to lack of irrigation.

3. The following table shows the season-wise mean (1961-60) total rainfall and number of rainy days in Liburagh district.

<table>
<thead>
<tr>
<th>Season</th>
<th>Total Rainfall (m.m.)</th>
<th>Total Rainy Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-monsoon</td>
<td>303.4</td>
<td>129.9</td>
</tr>
<tr>
<td>Monsoon</td>
<td>2456.0</td>
<td>89.4</td>
</tr>
<tr>
<td>Post-monsoon</td>
<td>135.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Winter</td>
<td>118.0</td>
<td>11.7</td>
</tr>
<tr>
<td>Total</td>
<td>2709.4</td>
<td>151.7</td>
</tr>
</tbody>
</table>

Source: Agriculture Census, Assam, 1970-71, Table 1.
it was already pointed out that a second crop of
H.I.V. paddy gives better yields and this would be
possible with irrigation only. The construction
of permanent irrigation canal by individual farmers
was costly as well as difficult. Moreover, no
single village was provided with electricity which
could have helped the installation of tubewell
or lift irrigation through electrically energized
pumps.

flood and waterlogging:

It may appear to be strange to speak of
the problem of flood and waterlogging just after
emphasizing the need for irrigation. Both lack of
irrigation and waterlogging (and also flood) are
alternate problems in different seasons. The
surplus water of monsoon season frequently spreads
over the cultivable land and inhibit cultivation
or often damage standing crops precariously. Also
in the absence of effective outflow drains water
remains stagnant over the crop fields during monsoon
when the rivers remain in spate.
It was reported by the farmers that in times when the fields were submerged under water either due to flood or waterlogging the use of fertilizers became a fruitless investment. Further the adoption of H.I.V. paddy, being dwarf, was difficult in waterlogged areas. Again it was reported by the farmers that during monsoon when crop was attacked by pest and diseases, the use of insecticides in waterlogged areas became ineffective.

**Problem of Institutional Finance:**

Owned funds constituted a major source of finance for investment. 89 and 91 per cents of current farm expenditure and long term investment (capital expenditure) respectively were contributed by owned funds. Lack of credit facilities has a restraining effect on investment as it is not possible to meet all investment expenditure from own resources.

In regard to current farm expenditure (including short term investment) the cash requirement was low because of the use of traditional inputs. The limited opportunities for the use of modern (purchased) inputs led to low demand for borrowings.
in case of finance for long term capital investment, it was observed that farmers in lower size of holdings proportionately borrowed more than big farmers, but they had to rely more on money lenders, merchants, friends and relatives. In contrast farmers with larger holdings proportionately borrowed more from commercial banks and other governmental agencies. The common procedure of guaranteeing immovable property (land in case of farmers) against a loan from these institutions was the main reason for which the farmers either did not like to borrow or could not get the required amount. The procedure had significant bearing on the farmers with smaller size of land holdings. Another reason was that the farmers, generally, did not like to surrender their land as security against a loan for fear of forfeiting its right in the event of failure to repay the loan. So long agriculture has to depend on the vagaries of nature the uncertainty of production will prevail and under such circumstances the fear of the farmers cannot be said to be totally unreasonable.

Except two, in almost all the sampled villages the performance of co-operative credit societies (wherever such societies existed) was not found to be encouraging.
The paucity of funds was the primary problem of the societies. Borrowings of the farmers from co-operative societies for productive investment in agriculture were insignificant.

Unless institutional finances are related to production instead of the prevailing system of relating it to assets it cannot be expected to exert any perceptible influence on agricultural investment. At the same time without a closer relation between Public Credit institutions and needy farmers predominance of Private Credit agencies will be difficult to reduce.

Performance of Extension Agencies:

There are three main objectives of extension - (i) increased production, (ii) improving techniques and encouraging peasants to change their traditional static attitude into one that is scientific and dynamic and (iii) developing the community spirit and strengthening co-operatives (U.N.I. 1962:22).

Keeping in mind these objectives, assessment of the performance of extension agencies revealed that it was not at all satisfactory in the sampled villages.
The Community Development Blocks are the chief agents of agricultural extension. It was found that out of 16 sampled villages only 5 villages were situated within a distance of 5 km. from the blocks headquarters. As such it was difficult for the farmers in most of the other villages to be at constant touch with the respective blocks offices. The agricultural extension officer is to look after the extension programme in the entire development block covering 10 to 12 thousand farming families. A Village Level Worker (uram bewak) is to convey new ideas to about 2000 families. It is practically impossible for an Extension Officer to contact regularly a large number of families at villages during a short period of time (because of seasonality of agricultural work). Also it is not possible for the Village Level Worker to help and guide so many farmers in adopting improved technique of production in an effective manner.

Moreover, it was found that the extension staff attached to the development block was quite inadequate. Whenever a demonstration (one of the most effective means of conveying new ideas to the farmers) was done further follow up action was not undertaken.
It was surprising to notice a model farm located near a sampled village in a very precarious condition which might have done more harm than good.

A few farmers complained that when they decided to adopt improved methods they had to face difficulties arising out of inadequate supplies or the necessary inputs. In this respect the role of the Gaon Panchayats was also not satisfactory. The Panchayats were found to be preoccupied in multipurpose activities and were not able to give necessary attention to the more important task of agricultural extension.

Problems of Input Supply:

The cultivation of high yielding variety of seeds of paddy was very low in the sampled villages. The proportion of area under high yielding varieties to the total gross cropped area was only about 3 per cent. Non-adoption of high yielding varieties on an extensive scale was mainly due to non-availability of satisfactory varieties. The available varieties being dwarf were not suitable for cultivation in the flood prone and waterlogged areas. Some farmers were of the opinion that some of the available varieties
were very much prone to pests and diseases. It was also complained that the seeds supplied by the Development blocks through the Vasan Panchayats were found to be of inferior quality. The President of a Vasan Panchayat reported that he had been supplied with some quantities of certified seeds for distribution among the farmers, but he found that the seeds sown in his own seedbed did not germinate. Such event generally had shaken the confidence of the farmers on such certified seeds and as a result they became hesitant of using the seeds.

The use of chemical fertilizers, insecticides and pesticides was negligible. Only Rs. 343.00 and Rs. 158.00 respectively were spent on these two items for a gross cropped area of 54.27 hectares. Moreover, it was observed earlier that the farmers used to invest more in terms of kind. A system of supplying these inputs in exchange for produce would have helped the farmers to use more inputs. Moreover, the supply of these inputs were not regular and within the easy reach of the farmers. The willing farmers sometimes had to go to nearby urban or semi-urban centres to purchase these inputs. There was no provision of

4. A similar observation was made by Goswami (1963:82) long ago.
selling these inputs through mobile sales van in the local weekly markets. Such a system of marketing the inputs in the local markets would have helped the farmers to purchase easily and in time these inputs as they used to visit these markets regularly. Neither the co-operative societies nor the panchayats had sales centres in different villages.

Education:

In the sampled households it was found that more than 66 per cent of total adult population engaged in agriculture were either illiterate or had education only up to primary school standard. Nobody with higher education was found to engage in it. As agriculture was not adequately remunerative, the parents in general did not like to engage their sons and wards with certain standard of school or college education in agriculture. Moreover, as has been observed by Etienne (Leduc 230), school education had strengthened the prejudices of the educated youths against manual work.

General education may not have direct bearing on agricultural progress. But it should also be admitted that certain standard of school education is necessary at least to understand the technical aspects
of an innovation, the legal provisions of land reform measures and the like. Farming is more a science and less an art. Education may help in the diffusion of technological change at a faster pace.

Other Allied Problems:

Enclosures:

Another important problem with the farmers was the problem of permanent enclosures of the crop fields. The practice of taking care of cattle, goats, horses etc. as in some other parts of the country is not in vogue in rural areas of Assam particularly in the area under study. These animals are set loose to graze in the fields. Therefore, the possibility of damage to crops is always there. Bamboo and wooden enclosures cannot be retained for more than a year or so and thus involves heavy recurring expenditure. On the other hand the initial cost of permanent enclosures (e.g., barbed wires) is very high.

It was for such reasons the sampled farmers had to incur heavy expenditure in providing enclosures to their crops.

5. The expenditure on enclosures could not be assessed because the farmers could not provide us with even approximate data on such expenditure. The difficulties were due to the fact that certain households provided enclosures to their crop fields along with areas under homestead, miscellaneous tree crops and grooves etc.
Land Settlement System:

System of land settlement also stood in the way to productive investment. Apparently the system of land settlement has nothing to do directly with investment, but as long as land remains to be considered as an asset, its heritable and transferable right of ownership has psychological impact on the users of land. Only 56 per cent of land was owned by the farmers under the land settlement system of *periodic share*, with permanent heritable and transferable right of ownership. It was observed that in certain villages where land was held by owners under systems other than *periodic share* expressed their apprehension of losing the right and therefore they were found to be very much reluctant to permanent development of land. There is also another aspect of temporary settlement which sometimes creates difficulties. Some corrupt pretty revenue officials, (like *mandal* and *manango*), taking advantage of the limitations of purely temporary settlement system, harass the innocent farmers by squeezing money and materials.

Tenancy:

The terms of tenancy arrangement was a restraining factor of productive investment.
known that tenancy not only affects profitability of investment adversely but also it raises the cost of production and thereby dampens investment. Of course, in the sampled households tenancy was not an acute problem, but out of total leased in land 64 per cent of it was held under crop-sharing terms of tenancy. Further land leased in on any terms of tenancy was available only for the cultivation of one crop. High rent (the value of 50 per cent of crop) reduced the profitability of investment and raised the cost of production. On the other hand it discouraged the cultivation of a low value second crop leading to low intensity of cropping. It should also be mentioned that the sampled farmers' preference to crop-sharing, by and large, was due to the existence of the element of uncertainty in agriculture. Again 32 per cent of total leased out area was under share-cropping with the sampled households. In case of leased out land lessees' preference to crop-sharing originated, apart from other reasons, from its comparative profitability over personal cultivation with hired labour. Its profitability was higher in comparison to other types of investment etc. Unless uncertainty in agriculture is reduced (if it cannot be avoided altogether) by reducing its extreme dependence on nature, such a tenancy system will remain to be preferred by the farmers.
sociological factors:

Sociological factors were also responsible for inhibiting higher and productive investment in agriculture. The farmers were bound by the tradition of monocrop culture. Winter paddy alone occupied 78 and 87.6 per cents of total gross cropped area and total area under paddy respectively. They preferred leisure and enjoyment to cultivation of another crop during the dry months. In general the farmers were found to look at agriculture as a source of subsistence rather than as a commercial proposition.

Another inhibiting sociological factor was the casta prejudice of the farmers. Because of their caste prejudice it was found that some farmers did not cultivate by themselves and engaged hired labour for which cultivation became unprofitable. Goswami (1963:106) also observed that owing to prevailing social custom some high-caste Hindu landowner did not cultivate land by themselves and either leased it out under share-cropping or cultivated with hired labour.

The constraints cannot be completely segregated from each other. They are complementary as well as supplementary in character. For example high yielding variety of seeds can give more yields only when it is
supplemented by controlled water supply and required
dose of fertilizers. Similarly, the intensive use of
land (i.e. the raising of intensity of cropping)
requires irrigation facilities and use of fertilizers.
Under such circumstances the lack of one affects the
returns from the other and the expected result is
difficult to attain. Profitability diminishes. Farmers'
expectation gets blunted. They become sceptic to adopt
a new technique of production. Demand for new factors
decreases leading to a demand supply disequilibrium which
in turn causes a decline in supply of these factors.
A vicious circle of constraints appear inhibiting
investment in highly productive new factors and thereby
restricts agricultural growth.

To restrict the onset of the circular
constraints and to achieve a technological change, a
package approach is inevitable. But to make available
all the components of a package approach by the farmers
themselves is not only prohibitively expensive but
also practically difficult. Some of the basic components
of the improved technology are to be made available in
order to provide the basic infrastructure at the farm
level, only then the economic incentive to accept, adopt
and use new productive resources can be expected to
appear.