CHAPTER 6

ANALYSIS OF THE IMPACT OF EXISTING AGRICULTURAL INFRASTRUCTURE AND LITERATURE ON AGRICULTURAL SCIENTISTS OF NORTH EASTERN REGION

6.1 INTRODUCTION

The success of modern agriculture largely depends upon agricultural literature. These literature are the results of research outputs generated by the research workers, scientists, technologists who are engaged in various capacities in work in different agro-climate condition of the region. These research outputs are new products or techniques which constitute the essential elements in the field of agriculture science. Following are the impact of agricultural literature of N.E. Region:

1. Serving as the filter on cross-fertilization of researches especially on the problems of adaptive research at micro level. who where the desire goals have not been achieved.

2. Pointing out missing links in agricultural production systems which demand priority attention. However, concerted efforts in these thrust areas are needed to rectify the region imbalances. These could be sharpened through future line of research suitable for different cropping systems at various farming situations in the region.

3. Indicating large gaps between the potential of improved agricultural technologies and the achievement at the farm level in different ecological situation in the region. This limitation in the field of agricultural research is one of the areas which needs urgent attention.

4. Helping to identify new frontier research areas and to find out answer to the new emerging challenges, where agriculture is facing to meet
the future demands of food, fibre, fuel and other essential requirements. Therefore the goals to increase food production could be achieved by the application of science and technology which are vital to the farmers.

(5) Pointing out basic and applied research on all aspects of crops under diverse agro-ecological solutions and to conduct research on some of the regional problems wherever the local research infrastructure are not yet fully developed, to avoid wasteful duplication of work resulting in wastage of materials, energy, time and other valuable resources as well as harmonise disparities in respect to growth of agricultural production.

(6) Encouraging to take up research for solving location specific problems in specific areas as well as on multi disciplinary research on multi location testing of newly developed technologies, both on crop based and discipline based for wide ranging nature. This ensured an integrated approach to diffuse the pertinent findings to the farmers to boost agricultural production.

(7) Targeting top priority research on nature resource conservation, traditional crops, livestock productivity with much emphasis on emerging research aras like biotechnology, tissue culture, bio-engineering, genetic engineering, etc., by adopting latest technologies to achieve superior crop production both qualitatively and quantitatively to meet requirement of growing population.

(8) Motivating to test experiments, new methods with new crops without causing adverse effect on the environment and ecology. Low value crops have been replaced by high value crops. In this way, it revolutionised local agricultural economy. This is a crucial step for raising productivity of land and popularising new agricultural technology.

(9) Exploring a variety of options with more flexibilities by applying new improved method which offer amazing possibilities of new technologies
e.g. increasing shelf-life as influence by various packaging materials, pest resistant crops, facilitate transportation, etc., to minimising the qualitative and quantitative losses of the agricultural commodities before selling in the market. This create new source of income to rural people and generate employment opportunities for both educated and uneducated unemployed youth.

(10). Monitoring research which may have major implications of future by using new materials, new varieties, new strategies and improved production technologies which could raise agricultural production with rich dividends. This was a crucial task challenging the agricultural scientists of N.E. Region to come forward with innovative ideas, since we are on the threshold of the new revolution.

(11). Projecting numerous on going research projects not only in agriculture sciences but also in other areas in animal science, fisheries, agro forestry, etc.. All such research projects are based on the research needs of the corresponding states in the field of agriculture. They formulate a mechanism for joint evaluation of the new technologies evolved by the scientists and enable them to arrive at collective recommendation for the release of these technologies to the farmers. These research projects are always encouraging researchers, scientists, technologists to get their involvement in such specific oriented mission to solve current and emerging problems through massive application of scientific technological innovations.

(12). Providing communication process on problems identification, by identifying both low and high priority research within the limits of available resources for the transfer and delivery of research knowledge and technology.

(13). Stimulating new research design to suit agro-climatic, socio-economic, soil conditions of the region. To generate new technology with better methods for growing a wide ranger of fruit crops, commercial crops,
horticultural crops, etc. This is an integrated approach for providing higher net return to the farmers. This effects steady agricultural progress.

(14) Prompting to introduce and popularise the modern methods of cultivation practices, high yield, pest resistant varieties developed and tested for this region. These suitable packages of technologies are the outcome of investigative findings through a systematic process of experimentations, laboratories, farmer's field trial to increase crop production. They are, therefore, developed to that they are best suited to the local farming conditions of this region.

(15) Facilitating to undertake operational research in testing and verifying the suitability of the new agricultural technologies. Studying the constraints found by the farmers in the transfer of the technologies related to crop production, plant protection, mixed cropping, animal husbandry, fisheries, food crop production. The constraints may be technological, socio-economic, cultural, institutional, administrative, legislative, etc. The gaps between the technology generated and that practised by the farmers can be minimised.

(16) Announcing frequent workshops, symposia and series of seminars training programmes at regional, national and international levels. Workers are benefited for sharing their experiences with each others as the agro-climatic conditions are more or less similar. These inter-disciplinary and inter-institutional interaction would, therefore, provide and excellent opportunity to exchange ideas, materials, for evolving suitable projects on allied and disciplines to take the critical problems in certain areas of the region. This help in updating technical information as well as providing fruitful interaction on various issues for evolving suitable strategies for enhancing agricultural production. These sort of trainings helped to develop the capacity to generate, adapt and apply the technology. This will permit them to apply their specialised knowledge as members of multi-disciplinary teams whose primary objective is to generate agricultural technologies. The results presented are critically
evaluated for their usefulness in agricultural development. However, the research infrastructure in the far-flung area of North Eastern Region is an isolated effort in their respective area rather than work which is integrated by multi-disciplinary teams. This exercise helps to monitor the progress and able to overcome deficiencies, if any.

(17) Identifying many areas research need to be focussed. To tackle these complex and emerging problems, Future research is necessary to elicit possible solutions with viable alternatives since problems in this region are numerous.

(18) Encouraging to introduce new crops after careful evaluating their suitabilities. These suitable varieties can be further developed to achieve desired results based upon production technologies for the benefit of the tribals, due to climatic suitability of the region to grow a wide range of crops.

(19) Initiating changes in cropping systems, agricultural practices, traditional farming systems, etc., which are no longer able to meet the need of our rapidly expanding population in different eco-systems having inadequate infrastructural facilities. This can be achieved by utilizing the newly developed technologies for a specific agro-climatic zones to meet the requirement of food and livestock production in the region. This has also helped in improving the economy of the tribal dominated belt as well as to reduce the soil hazards of the region.

(20) Highlighting to intensify narrower areas of research on important aspects as rodent control, biological control, weed control, research on algae as sources of biological nutrition and protein food etc., to mention a few as to upgrade agricultural productivity to meet the rapid changing environment in the society.
(21) Advocating methods, techniques to interact with the farmers, scientists, extensionists and information dissemination in order to modernise agriculture based on scientific management in this region. These serve as practical solutions to meet the diversified growing need of the farmers.

(22) Inspiring that in order to diffuse agricultural technology to the farmers which slow down the technology transfer process, there should be a continuous flow of information to the farming community on production problems confronted by them, which limit agricultural production. This mechanism must be provided at the grass-root level to permit the flow of research to farmers.

(23) Activating to bridge the wide gap between the production potential and the actual production in the region. The front-line demonstration serves as an ideal approach in this direction to achieve productive goals. It is aimed at disseminating the proven technology to the actual Users at a faster rate. This new technology acts as the window to the world of production, plenty and prosperity. This encourage the farming community for accelerating production and productivity in crops, livestock, fisheries and allied areas.

(24) Focussing critical gaps in the man-power resources requirements in various development departments in different branches of agriculture. This deficiency can be augmented by providing attractive incentives, etc., to research workers. Therefore, the gap between the potential and prformance has to be bridged to achieve the desired targets.

(25) Communicating a land to lad programme for improving the feedback mechanism received from the progressive farmers. This deserved immediate attention for further improvement of the technologies, expeditiously and made useful to the economically deprived farmers.
Therefore, these research results stemmed out from the agricultural literature are producing various outcomes, which are the direct benefits to the organisations, institutions, society, mankind, giving assurance to the people and well-being of humanity through adoption of new innovations. They play an essential role in helping the region to achieve the high development goals which are related to agricultural production.

6.2 Analysis of surveys: Different surveys in different aspects have been completed and the following are the analytical findings.

6.2.1 Year-wise production of Agricultural Literature:

The production of agricultural literature of the North Eastern Region from 1976 to 1982 is steadily growing up from 119 (2.00%) to 223 (4.15%). This may be due to the establishment of the North Eastern Council in 1972 that facilitates manpower training programmes. New projects have been launched to boost agricultural development. The setting up of the Indian Council of Agricultural Research in 1975 to cater to the needs of research in agriculture and allied fields is another crucial factor. Research stations in different parts of the region were also established. The immense potentialities of the region are vast. However, this attracted the research workers, scientists to conduct research and experiments with new technological innovations. Some of the research institutions which have been established after 1972 include North Eastern Hills University, Naga-land Agricultural University, etc. are extensively involved in the research infrastructure of the region. Modern scientific equipments have been initially installed in different research institutes, research stations. However, these available facilities facilitate further fruitful researches.

From 1983 onwards the growth of agricultural literature is neither constant nor increasing till 1990 with 218 (4.08%) to 261 (4.86%) respectively. The reason is that there is socio-political unrest during these periods.
From 1991 to 1994, data reveals that there is sudden increase of agricultural literature on North Eastern Region from 287 (5.4%) to 409 (6.44%) Perhaps this may be due to recruitment policy of agricultural scientists for this region has increased considerably due to various optional facilities offered to them. Maximum numbers of scientists are engaged in various research projects sponsored by the Government of India to tackle the untapped resources of the whole region. Research institutes, agricultural universities are encouraging the young scientists to conducts research extensively in different fields of specialisations. These research institutions are paying due attention to conduct narrower areas of research due to sufficient fund availability.

In 1995 the agricultural literature comes down to 236 (7.10%). This may be due to many factors such as environmental fluctuation of weather climate, high temperature, rainfall, snowfall, fog, sunshine, humidity etc. Which discouraged the scientists.

While in 1996 the agricultural literature increased to 381 (5.56%). It is indicative that major projects have been launched in different disciplines for example in ICAR, the National Agricultural Technology Project (NATP) has launched sizeable projects for development of agriculture in this region. Another worth mentioning is the collaborative efforts of the international agencies to conduct further research in the field of agriculture e.g. in biotechnology.

Output of agricultural literature is more than 400 in 1994 because 2/3 workshops seminars were conducted by the ICAR Institute in this region during that time. But during the other four years i.e. 1992, 1993, 1995, 1996 the publications have been increased to between 301-400. This may be due to shortage of resources and lack of fund. in comparison to the year 1994 therefore, research could not be conducted much progressively during these years. However during the long twelve years i.e. from 1980 to 1991, the
literature output is between 2001-300 only. This is indicative that a ned based research can be conducted only when new problems cropped up. Based on the remerging problems, research projects could be formulated. In the field of agriculture, to get the research paper published it takes 2/3 years for getting consistent results so as to arrive at meaningful conclusion from experiment. Acceptability of the proven technology to the farmers' took maximum years due to diverse agro-climatic and socio-economic conditions of the region based on the locally available available resources. Minimum number of literature i.e between 100/200 have been produced in the first four years i.e 1976 to 1979. This is due to shortage of scientific personnel and inadequacy of infrastructure which adversely affected agricultural productivity.

6.2.2 Subject-wise Contribution of Agricultural Literature:

(1) Entomology: - The Scientific study of insect activities including their structures, behaviour, their place in nature and form whether they are harmful or useful to man, also includes taxonomy, ecology, insects that are pests to crops or carrying diseases to man or livestock, have been contributed by 1035 (19.27 %) number of agricultural literature. This may be due to the fact that plant protection is the major component of agricultural practices. Gangwar (1986) reported that the loss caused by the pests to the crops ranged from 20 % to 60%. In general, the losses may be qualitative and quantitative. However, Plant. protection measures are necessary to reduce the above losses. The climatic conditions with its high rainfall and humidity is ideal for building up and survival of pathogens which suits the multiplication of insect pests in this region. As a result, most of the crops have a large number of insects and diseases. for example stem borer, thrips, red ants, aphids, etc. These pests are causing serious damages to the crops. Rodent pests such as rat, mice, mole, etc., are also severely damaging the crops. Therefore, the agricultural scientists of this region have made extensive studies, conducting research on various insect pests of different agricultural and horticultural crops and work out their seasonal incidence, nature and extent of damage as well as control
measures. Apart from these, systematic efforts are also made to evolve suitable pest control technology, methods of application of insecticides, crops sanitation with latest technologies. Extensive research works are also carried out in right direction on pest complex of crops like maize, paddy, stored products, shorage structure and their residues to reduce serious incidence through scientific plant protection measures, natural biological control, indigenous method of trapping, cultural, cultural practices without harming the environment.

(2) Agronomy: Which is a science and technology of crop production concerning with the scientific use of plant, soil, water, farming of crops as an economic activity accounts for 971 (18.08 %) number of agricultural literature. This is indicative that Agronomy was a well established discipline since time immemorial. It covers broad aspects of activities such as traditional methods of cultivation of crops, monsoon, rainfall, etc., and their inter relationships. It provides a communication with the farmers in dealing with various activities e.g. sowing, weeding, etc. It develops positive attitude and ability to work and live in rural environment for effective transfer of crop production technologies into commercial crop production system. Because this region has immense potentialities for growing a wide range of crops such as cash crops, forage crops, field crops, etc., Rainfall and climate also provide favourable environment for luxurious growth of weeds. Therefore, agricultural scientists are intensifying research on crop production technologies, weed management, agronomic practices, crop sequences at different situations to boost agricultural productivity in the region. Detailed studies are also being carried out to replace jhum cultivation which adversely affected productivity through permanent cultivation by adopting parallel, multiple cropping through judicious use of manure.

(3) Plant Pathology: Which deals with diseases of various crops and their control measures have been contributed by 824 (15.34 %) number of agricultural literature. Perhaps, the climate of this region with its high rainfall, high humidity and favourable range of temperature make an ideal condition
for survival and build up of plant pathogens. Therefore, most of the crops cultivated in the region are affected by pests and diseases. A wide variety of grasses and undesirable weeds abounding in this region, which serve as an alternative host to the plant pathogens in completing their life cycles. Therefore, systematic and detailed survey of diseases have been launched states of the region to identify the major plant diseases, problems and thereby to develop a problem oriented - need based research strategy to control the major diseases affecting the different agricultural and horticultural and horticultural crops of the region. Detailed studies on more destructive diseases of some major crops were initiated at specific locations. Suitable management practices to keep the diseases under control were undertaken. These include use of resistant varieties, seed treatment, foliar spraying, fungicides, cultural practices, mode of application, post harvest treatment, etc. Nweke (1988) in his study conducted on world literature on cowpea (vigna unuiculata) L Walp found that Agronomy tops the class with 163 items or 32.8 % of the total literature. Diseases, pests and control follow closely with 157 items or 31.6 % of the total literature. This indicates that greater research attention was paid to the generation of literature on diseases, pests and control as any other category. This is not surprising that diseases and pests are the major obstacles in cow-pea (agricultural) production and storage. Hence greater attention was paid to their study and control. Diseases, pests and control include physiological diseases as well as those caused by fungi, bacteria, viruses and their control; Insects and storage pests including rodents and birds and their control.

(4) **Soil Science**: Contributed 496 (9.24 %) number of agricultural literature because it is the most important natural resource which supplies food, fodder, fuel and feed requirements of human and animal population. About 95 % of the soil in North Eastern Region were found acidic in reaction (Prasad and Singh. 1987). This type of soil not only gives low yield of crops without manuring but also shows poor response to fertilizer. The quality of soil is also deteriorating due to increasing of degradation brought about by
various factors, such as soil erosion due to the general mis-management, large scale deforestation, shifting cultivation, desertification, water-logging, reckless mining activities, road construction, saline and alkaline soil toxic effect, flood, etc., which lead to loss of plant and soil nutrients. These factors have adversely affected agricultural development with low-yield-low-output. Considering these factors, agricultural scientists have undertaken research studies such as soil and water conservation, correction of soil acidity, method of lime application, use of biofertilizers, etc., so as to develop cropping pattern to raise crop productivity in this region. To restore and maintain soil fertility caused by shifting cultivation, survey on soil degradation is undertaken to identify major problems of the region. Therefore, research is intensified at various locations to restore there deficiencies with improvement methods which has vital bearing in the agricultural economy of the region. Agricultural scientists after successful laboratory experiments has to test the seeds or crops by sowing into the soil as adaptive trial methods, before transferring the technologies to the farmers. This farmer-to-farmer approach helps the scientists to design and develop new technologies. Thus the soil serves as a feedback both to the scientists as well as the farmers.

(5) **Horticulture**: Encompasses a wide range of crops, fruits, vegetables, flowers, spices, aromatic and medicinal plants as well as plantation crops and contributes 691 (12.89%) number of the agricultural literature. Perhaps, the region has a wide diversity of geo-climatic conditions ranging from alpine through temperate to sub-tropical and tropical conditions suitable for growing an array of horticultural crops. But most of the horticultural crops have low productivity due to poor cultivation practices, lack of storage, processing and transporting facilities. Therefore, agricultural scientists have taken extensive research based on biodiversity of the region to improve the production of various crops. Due attention is also given to systematic location, specific crop planning in accordance with the agro-climatic suitability of the region. These include scientific multiplication, propagation methods, planting materials, spacing, harvesting, storing, transportation and using the finished
produce through scientific post harvest technology. Intensification of research is also conducted on nutritional manure schedule to conserve soil fertility to increase horticultural crops productivity.

(6) Forestry/Environment: Dealing mainly with cultivating forests, the systematic utilisation, reproduction and improvement of the productive capacity of trees in masses, including the planting and culture of the new forests, is contributing 683 (12.72%) number of agricultural literature, because research is being conducted in different aspects as an important natural resource which influences climatic, soil condition, particularly water extension capacity, soil erosion and water balance, flood, maintenance of biosphere, environment as well as wild flora and fauna, temperature, evaporation, humidity, wind, ecology, monsoon, etc.,. This region is rich in natural vegetation due to favourable climate for growing various types of tree plantation; therefore, systematic studies were initiated in different locations of the region to develop suitable management strategies. With the depletion of forest resources, excessive felling of trees in the recent past, due to shifting cultivation, unscientific management, explosion of population, urbanisation and other aspects of development, forest management has become necessary to meet and satisfy all aspects such as social and economic needs, wild life preservation, fodder resources, fuel and timber, etc.,. Another aspect with particular to N.E. Region is the important role in maintenance of stream, preservation of flood in the plain, control of harmful exploitation and conservation of forest resources. To meet the extensive requirement, research studies are being accelerated in these aspects with latest technologies to meet the continuous requirement for ecological sustainability and agricultural growth of the region.

(7) Plant Breeding/Genetics: Which represents the conservation, utilisation and preservation of plant genetic resources for the good of present and future generation is also concerned with the systematic collection of wild relative of crops, crop improvement, breeding methodology and genetic
enhancement of the crops. It is contributing 433 (8.09 \%) number of agriculture literature of this region. This discipline is of recent development which was established after 1973. Therefore, it has not attracted wide attention. The impact of green revolution with the availability of high yielding varieties of plant resources under better technology to suit varied land has decreased the area under natural cultivators in this region as well. Research started to progress with the setting up of the state agricultural departments and recently central agricultural research institutes. Crop improvement programmes were initiated. Because the region of great diversity is under serious threat due to rapid extinction or depletion of germ plasm due to various factors such as environmental destruction caused by large scale deforestation, shifting cultivation, soil erosion, flood and earthquake, mushroom growth of industries like plywood factories, paper mills, population explosion, demographic pressure and careless technology without proper planning has led to depletion of genetic resources. The traditional genetic resources are gradually getting obsolete resulting in the erosion of indigenous plant wealth. The region is also possessing many plant species which are yet to be utilised properly by man. The wild relatives and primitive plants of N.E. Region present an enormous wealth of genetic variation for use in the current plant improvement programmes and for catering to the unknown needs of the future. However, sporadic surveys were undertaken for collection of indigenous cultivars viz., tea, legume crops, rice and several others. Recently systematic and major efforts have been launched by National Bureau of Plant Genetic Resources (NBPRG). Umiam to conserve the available plant genetic diversity involving wild, primitive and cultivated types through scientific management for future use.

6.2.3 Gaps in Research:

The study reveals that the three disciplines namely Agricultural Engineering, Agricultural Economics and Agricultural Extension are the least ones contributed among the number of agricultural literature in this region.
(1) **Agricultural Engineering**: Agricultural Engineering deals with the application of knowledge, techniques and discipline of various fields of engineering to the solution of problems arising in the field of agriculture. It deals with the design and use of agricultural implements, soil and water conservation management and processing of agricultural products. This discipline contributes only 120 (2.24%) number of agricultural literature in this region. This clearly indicates that human labour is the major source of energy for agricultural operation in the entire region. Geographical topography as made the task extremely difficult and most challenging. Farmers still depend primarily on hand and not on mechanical weeding implements. Agricultural farm tools, implements, equipments of traditional types are still being used to a large extent. Improved tools and implements have not become -popular and are not available for hills situation and terrace cultivation. Low cost multiple devices made out of local available materials such as yoke drawn power from draft animal, wooden plough, water lifting devices have been in use till date. Numerous farming operational technologies such as seed-bed preparation, sowing, weeding, harvesting, etc., which are economical are yet to be introduced to the farmers. Many mechanised equipments have not reached the farmers' field. However, demanding more R & D efforts, design, refinement with user's feedback. Power-tillers are expensive and costly, only well-to-do farmers can afford to use. Small farm equipments fabricated by local craftsmen are the main farm machinery used by the farmers. Adoption of small earth dams as water storage device have not yet reach at the farmer's level. Water harvesting utilisation with local available resources have not yet been implemented. Various soil and water conservation measures, techniques are not economically feasible to adopt due to the very nature of terrains. Location of plots, sizes, cropping systems, etc., limit the scope of using large machinery. Imparting training to village artisans is badly lacking.

(2) **Agricultural Economics**: Agricultural Economics which is concerned with farm management and production contributes only 65 (1.21%) numbers of agricultural literature on North Eastern Region, perhaps due to
the following reasons. Only a few agricultural scientists have joined this discipline. Hilly terrains and poor transportation pose great problem for development process. Supply of essential commodities and agricultural inputs, etc., are still lacking considerably besides absence of intro and inter departmental linkages, poor organization support and non-governmental agencies. The fruits of research has not got transferred to the farmers' field. In the remote hilly areas, agricultural marketing is still in a rudimentary stage. Primary and secondary markets are either totally absent or extremely inadequate. Lack of agricultural marketing boards for products. Such as, rubber, coffee, tea, etc., to accelerate the pace of agricultural development. There are impediments to the introduction of modern technologies such as plant protection chemicals and other necessary inputs. No such suitable crop rotation practices have been followed mainly due to ignorance of the farmers and lack of infrastructures. Absence of proper and adequate storage facilities, the loss of food grains has been considerable. Comprehensive and detailed information about horticultural crops relating to yield, varieties, management, etc., are not available due to lack of trained personnel. Crop insurance scheme have not yet been introduced to provide financial support to farmers in the events of crop failure due to drought, fold, certain unseen events like riots, political turmoils, etc. Information gathered about farmers' needs are insufficient, inadequate and inaccurate. Wide gap of interaction between farmers on the one hand, research and extension workers on the other hand. Lack of proper communication skill, wide gap in language communication. Sample survey techniques for estimation of crop production along with cultivation practices and livestock products such as milk, eggs, meat, etc., are very meagre. The currently used indicators in official statistics and policy analysis for determining national and regional sectors can be feasibly misleading indicators for sustainable economic development.

(3) **Agricultural Extension**: Agricultural Extension deals with the process to convey to farmers the results of agricultural research and other better methods for better farming through demonstration and other media
and assisting them in the adoption of better practices. It also includes the creation of awareness which is a basic requirement for any transfer of technology, programmes, etc. This discipline contributes only 51 (0.95%) number of agricultural literature on this region. This may be due to communication gaps in vital areas. Viability of technology developed through research have not reached the farmers. Extension programmes are being carried out in the region primarily by the government departments of agriculture. Agricultural extension in the remote areas of the hilly region is not adequately organised. Behavioural attitude towards adoption of agricultural extension is very poor. Most of the farmers do not have enough means to adopt improved technology. Therefore, viable technology cannot influence in the production process. The adoption of agricultural technology by the tribal farmers has been in low profile. The process of extension service is very slow to pass through the farmers to adopt the new technology. Majority of the farmers have very poor contact and exposure with the agricultural extensionists. Appropriate technology suitable for specific situation prevailing in the region is not available. Inadequate infrastructures for example, irrigation, market supply of inputs such as seeds, chemicals, fertilizer, etc., are hampering the transfer of technology. Agricultural production programmes are liable to be variously affected due to weather, climate, and variations such as drought, flood, etc. Economic status of the farmers does not permit investment in agriculture. Various governmental departments are not co-operating inspite of available resources. There is lack of effective co-ordination among the various sectors, agencies which are directly involved in the implementation of the developmental schemes. The flow of information sources, services is badly lacking. Complex and diversified information needs of the farmers has not been identified properly. Farmers' training centres are very limited. Dissemination of packages of practices to the farmers by way of field demonstration to motivate the farmers for adoption improved technology is very poor. Effective mass communication channel have not reached the far flung areas of the region. This is one of the major causes of agricultural backwardness. Operational research projects for testing the adaptability of
specific technologies are very poor due to many limitations. Socio-economic profile of the rural people is one of the primary reasons of agricultural backwardness. Land ownership pattern is another constraint in the adoption of improved technology. Faith, belief and custom prevailing among the people also pose a serious problem. A belief among the farmers is still persistent that the use of chemical fertilizer ultimately is harmful to the soil. Resource constraint is another hurdle and shortage of man-power for such extension services particularly in different terrain areas. Farmers are still practising an age old and rude method of shifting cultivation in hill areas.

Therefore, identifying these gaps in research which are crucial in the field of agricultural sciences may provide an effective tool to researchers in this region to evaluate the research efforts precisely and also to help in developing and removing the weaknesses. Prior efforts has to be taken effectively to devote and pay attention to these disciplines which are very essential for agricultural development.

6.2.4 Types of documents cited by Agricultural Scientists in N.E. Region.

(1) Periodicals: Of all the documents cited by agricultural scientists of North Eastern Region, Periodicals are the most favourable media with a cited count of 74.14%. This is indicative as the most productive form of document. Besides, being the primary sources of information, they are communicating new ideas of research findings. They also serve as the life blood of research. Therefore, they further encourage advance research in narrower areas as well. Periodicals have wide circulation, hence, the agricultural scientists feel that their contributions get timely recognised among the world scientific community. One of the important role which can be exemplified is that they report the current observation and experiment which is an added value to the research workers. They provide current and latest development in the respective fields of specialisation. Agricultural libraries of North Eastern Region have good collection of learned periodicals for the
potential users. However, they serve as vehicle for dissemination of technological development. They not only keep track of current technological innovations, but they also play a vital role in the advancement of science in the field of agricultural sciences. They are product of detailed study and research. Therefore, they exposed what is being done and what has been done by others elsewhere. They play a major role in defining a community of research workers according to their fields of specialisation, language and nationality. They are universally accepted as the most vital element of modern scientific and technological research activities. This is the single most important medium through which researchers communicate and interact with one another and they have great influence on the nature and direction of research carried out. They serve the purpose of giving a national identity to the different scientific community.

(2) **Annual Reports**: Another form of document with a citation count of 9.26% are Annual Reports. They form an important segment of monograph consulted by researchers because they provide current status of research in progress. For example the ICAR Library has a good collection of Annual Reports due to extensive exchange of publications with different research institutes of the country and abroad. Therefore, they are easily available to users. These documents promote greater understanding among scholars and eliminate isolation.

(3) **Government Documents**: With 4.31% of citation count are another form of literature cited by agricultural scientists of this region. Perhaps, these publications containing valuable data gathered from various sources of primary and secondary sources. They serve as reliable sources projecting future needs for policy making and development. Thus, it appears that research scientists rely on a vast variety of government publication such as progress reports, socio-economic surveys, technical reports, etc
(4). Research bulletins With 2.84% citation count are another form of documents cited by the agricultural scientists of North Eastern Region. These bulletins are closely linked with the current and future activities of the organization. They are the internal generated information within the research institutions. Therefore, they are the valuable research materials for research scholars.

(5). Oldest Publications With a citation count of 270% are another form of documents cited by agricultural scientists of North Eastern Region. These publications served as the base for conducting research. At the same time, they are the reliable tools for experimental procedures. Probably, they are referred as reference materials and for background purpose or may be due to non-availability of other source documents.

(6). Books are another type of documents cited by agricultural scientists of this region with 2.46% citation count. They are printed publications with factual information. For instance agricultural libraries of this region had specialised collection of books which are fruitfully exploited by the researches.

(7). Thesis and dissertations are the primary sources of literature cited by agricultural scientists with only 1.86% citation count. These written treatises have their own potentialities. However, these documents are the product of research activities and investigations representing achievements of academic pursuits. Therefore, they are not easily available due to their unpublished status.

(8). Statistical Publications are the reliable sources of literature cited by agricultural scientists with 1.37% of citation count. These publications are seldom used for specific information and statistical data.

(9). While the least cited form of literature are handbooks, technical bulletins, newsletters, research highlights, census, extension bulletins
and gazetters with a total citation count of 1.09 %. Although these documents are useful reference materials yet they are published at irregular intervals and late publication.

Thus, agricultural scientists of North Eastern Region cited different forms of literature in their research works. Therefore, the channels used to communicate scientific research are many and varied.

6.2.5 Year-wise Distribution of Citations by Agricultural Scientists in N.E. Region from 1976 to 1996:

The agricultural scientists of North Eastern Region cited maximum literature which all during the year 1980 - 1984 with 43.23 %. Perhaps, many bibliographies on agriculture for e.g. Indian Horticultural literature Vol. 1; Fruit Crops; Indian Soil Science Literature 1966 0 1977; Indian Literature on Vegetable Crops 1966 - 1980 and other useful publications were published in the year 1980s onwards. However, these publications serve both as authoritative information sources and reference tools to the researchers. The research they are conducting are quite progressive because of positive response and feedback received from farmers. Congenial atmosphere of laboratory research work. Adaptive trials on economic crops in the fields are quite successful due to favourable environmental factors, e.g. rainfall, weather, sunshine, etc. Transfer of technology to the farmers fields are quite responsive and remunerative.

The research scientists of this region are also cited literature ranging from 1985 to 1992 with 36.55 %. It is indicative that it takes more than five years in transferring viable technologies from laboratory to experimental field and them to the farmers' field, since many factors are involved such as testing, trial, designing, evaluating and refinement of the technologies suitable to this region based on available local resources.
However, they also cited the literature ranging from 1976 to 1979 with 17.73%. This may be due to the fact that majority of the agricultural scientists started to conduct research, experimentation in different disciplines with the new technology based on low cost locally available resources to counter the side effect of unscientific jhum or slash and burn agriculture prevalent in this region.

While the least with 2.49% falls within the year 1994 to 1996. This shows that there is less orientation of research at that time in the different field of agricultural sciences in the whole region.

Maximum citations i.e. above 12% is found only in 1981. Beside, in 1983 also the number of citations is between 8% to 12%. This may be due to comprehensive inclusion of review articles; therefore, citations are more. It is decreasing from 4% to 8% during the surrounding periods i.e. since 1976 to 1988 with exclusion of the earlier years i.e. 1977, 1981, 1983. It is further decreasing between 1% to 4% during the later years i.e. from 1989 to 1994, along with the earlier years 1997. This indicates that in some abruptive years short communications are more compared to full-length papers. Therefore, citations rate is also decreasing. The least citation were found in the last two years i.e. 1995, 1996 due to late arrival of publications, agricultural scientists are unable to cite current literature.

6.2.6 Chronological Distribution of Citations of literature produced before 1976 in Agricultural science in N.E. Region.

Maximum citations were cited with the literature published after independence i.e. from 1959 to 1975 covering a period of 15 years. During these decades, many agricultural research institutes, universities, organizations were established. Intensive research started to gather momentum because of improved techniques, utilization of new technology innovations. It is imperative that agricultural scientists of this region prefer to cite literature published
before independence to some extent because these publications extremely encouraged investigation of applied value in agriculture and allied. Besides, they keep in toch with the agricultural progress of the country. The least with one citation each was cited with a span of 20 years because these classical publications e.g. Review of applied Mycology, 1922; Fungi of India, 1931. Indian Journal of Agricultural sciences and Indian Journal of Veterinary Science and Animal Husbandary, 1931 contained fundamental ideas. Therefore, they are quite useful for background information, comparison with the current state of affairs and removed some of the isolations in which they worked.

6.2.7 Discipline - Wise Break - Up Citations in N.E. Region From 1976 to 1996.

Based on discipline - wise break - up of citations by agricultural scientists of North Eastern Region, Agronomy occupied the first rank with 778 (24.86 %) citations. This was due to the facts that this discipline was well established subject since time immemorial, therefore, it covers a broad aspects of agricultural activities.

(1). **Entomology** which is a recently developed discipline covers 589 (18.82 %) citations. Extensive research on scientific plant protections measures are being conducted to reduce the qualitative and quantitative losses of agricultural crops.

(2). **Soil Science** which plays a major role in the field of agriculture sciences. occupied the third place with 485 (15.50 %) citations. This indicated that extensive research is being conducted under different agroecological condition of the region to conserve soil fertility.

(3). **Forest / Environment** with 443 (14.15 %) citations has another influential characteristics, because this discipline has played another influential
role in maintenance of biosphere, preservation and conservation of natural resources to meet and satisfy all aspects of social and economic needs of human life.

(4). **Plant Pathology** which deals with diseases of various crops covers 339 (10.83 %) citations, because research had been conducted extensively on the nature, magnitude and various pests and diseases, e.g. blast, powdery mildew, bacterial blight, which are the major diseases of various agricultural and horticultural crops so as to keep the diseases under control.

(5). **Horticulture** which flourished well in this region is contributing with 310 (9.90 %) citations this may be due to low productivity of various horticultural crops caused by poor cultivation practices. Therefore research takes more time to combat with the majority problems of this region.

(6). **Plant Breeding / Genetics** as an applied science have been contributing 125 (4.09 %) citations because this field is of recent development. Therefore, it has not attracted wide attention and research in this field is not progressing.

(7). The three disciplines namely **Agricultural Extension, Agricultural Bond Engineering and Agricultural Economics** are the least cited with 58 (3.99 %) citations. Perhaps, this may be due to the fact that the other states presently do not have enough base for research.

The foregoing analysis points out that agricultural scientists of North Eastern Region are concentrating their research activities on Agronomy, Entomology, Forestry/Environment, Horticulture, Plant pathology, Soil Sciences. This indicates that intensive investigations, surveys, experiments, etc., are being carried out. The findings portray that research are not concentrating on other disciplines such as Agricultural Engineering, Agricultural economics. Agricultural Extension which has the least citations rate of 1.85
% However is considerable scope to develop these disciplines in the near future. This can be successfully achieved through intensification of research works. The study leaves the scope to extend further investigation to find out the various parameters of the data from 1976 to 1996. This would provide some more meaningful and useful results for better understanding the nature of the subjects on agricultural literature of North Eastern Region.

6.2.8 Rank List of Cited Agricultural Periodicals:

Nearly 96% of the literature covered in the present study have been published in different periodicals. This indicates profusion of periodical publications caused by increase in research. From the table it is evident that *Journal of Indian Society of Soil Sciences* ranks first with highest concentration of citations on agriculture in North Eastern Region. It is having 192 citations (6.13%). This is followed by *Two Bud* with 141 citations (4.50%). This is followed by *Indian Journal of Agricultural Sciences* having 106 citations (3.39%). *Journal of Research (A.A.U.*) 94 citations (3.39%), *Proceedings & Conferences* 84 citations (2.68%), *Entomon* 79 citations (2.52%), *Plant Soil. Proceedings of Indian Academy Science (Plant Sciences) Seminars* are having 72 citations (2.30%) each respectively, which is followed by *Indian Forester* 65 citations (2.68%), *Agriculture Ecosystem Environment* 59 citation (1.88%), *Journal of Indian Potato Association* with 55 citations (1.76%). *Current Science* 53 citations (1.69%), *Acta Oecol. Oecol. Planta* having 52 citations (1.66%), *Bulletin, Botanical Survey of India* 51 citations (1.63%). 61 periodicals account for 78.50%. The number of periodicals encountered in this study are 305 which contained citations on agriculture of this region and they share 42 ranks. The ranked list prepared by the application of bibliometric techniques help in the identification of the core periodicals in the field of agriculture. The non-elastic financial resources of the library, therefore, demand the identification of the core journals, effectively covering the most significant literature in the subject and thereby making the acquisition extremely selective. These periodicals are quite necessary to include in the
subscription list for procurement in the library. Eighty-eight periodicals in the rank list having 9 to 3 citations. 53 titles are having 2 citations and 103 titles with one citation each are the least important journals. Agricultural scientists of North Eastern Region placed great reliance on local, regional and national journals. Foreign journals in which North East's scientists cited are quite few. It is crystal clear that much agricultural research is reported in domestic journals. Further, it indicates that domestic journals are relatively stronger compared with the national journals of other countries. The results of the Indian science can be basically considered more accessible to the agricultural community of this region.

Inter-disciplinary nature of research resulted in the scattering of literature of a particular subject in a number of periodicals. Most of the published and cited journals are available in the library which reflect that the library is aware of the needs of the users. However, scientific and technological researches of this region have begun to receive due attention. The above used ranking of periodicals may be considered as a practical tool to select journals of maximum utility for the agricultural scientists of North Eastern Region. By doing this, the librarian can tide over the financial crisis due to price hike of journals and limitation of resources. The ranking of journals provides an approach for inclusion or exclusion of journals to the extent of the budget permits. However, the relative importance of the journals may change due to shift in R & D work of the institution or emergence of more appropriate journals covering sub-disciplines or multi-disciplines representing the scientists' work. So periodic review of ranking of journals once in three years should be beneficial. Observations may be analysed for establishing stability in the rank of important journals in the field of agriculture of North Eastern Region.

Self citation is another parameter which is used to indicate the rank of a journal. In this study Journal, Indian society Social Science emerged as the highest self citation rate having 54 citations (6.18%), which is closely
followed by Indian Journal of Agricultural Science with 45 citations (5.15%). Two Bud 33 citations (3.78%), Journal Research (A.A.U.) and Indian Phytopathology having 24 citations (2.75%) each, Current Science 22 (2.52%) citations. Seminar 21 (2.40%) citations, Indian Forester, International Rice Research Newsletter 19 citations (2.17%) Symposium, Arunachal Forest News 18 citations (2.06%) each, Journal Assam Science Society, Fertilizer News 15 citations (1.72%) each, Indian Journal, Hill Farming, Environmental Conservation, Indian Farming with 14 citations (1.60%) each respectively, Proceedings & Conferences, Journal Economic Taxonomic Botany, Annals Agricultural Research 12 citations (1.37%) each. It can be said that a paper which is cited fifteen times or more, it means that the paper still have the relevancy in the present environment because these are being cited continuously since the study is undertaken. Rest which is having below ten citations are scattered in different periodicals. Maximum self-citations are in favour of domestic journals. Another common feature is that authors cited earlier works. Thus, it reflects the scholarliness of the article or the journals. It further exhibits that the author has chosen a very narrow field of his study. This demonstrates that authors choose only citations that were published with their careers, while the work of others they choose to cite can be from literature published long before they began their research careers. The high percentage of self-citations in the mentioned journals is influenced by the reputation of the authors. It further reveals that the previous publications related to that particular field or theme. It is one of the methods to ascertain what information a researcher or scholar use seriously in the course of his research. In addition, it indicates the reputation of the journals in the field of agriculture in this region. In the light of the above mentioned facts, the increase in citations, self-citations in paper indicates that more investigations in the fields are being carried out.

6.2.9 **Major Findings on Information Use:**

(1) **Information Needs** :- The result of the information search by the agricultural scientists of North Eastern Region indicates, that maximum
percentage of information search was while starting project works (22.14%), which is closely followed by while undertaking research (21.91%); other factors in order of preference are research guidance (16.19%), writing an article book (15.71%), classroom reaching (11.91%), delivering special lecturers (10.24%) and the least with other purposes (1.90%). The reasons may be attributed because agricultural research scientists require general information such as.

(1) **Physical Environment or surrounding** :- These include climatic variables, rainfall, temperature, attitude and topography, vegetation, natural vegetation, soil and water resources, land tenure, land use pattern, crop production system, technology adoption, fruit and vegetable, crop improvement programme, livestock production etc.

(2) **Infrastructures** :- These include road facilities, market facilities, communication system, banking, operational holdings, rural industries, post harvest operation.

(3) **Socio-cultural Environment** :- Such as policy, house-holding, population, social stratification, employment, off-farm opportunities etc.

(4) **Culture** :- These include religion, traditional taboo, attitude to women, social obligat in, organization, decision making.

(5) **Institutional Environment** near by research stations, agricultural colleges, universities, organizations, etc.

(6) To keep track with new development.

(7) Whether any similar research has been carried out or conducted some where to avoid repetition of research.
(8) Gaps of research in particular field of agricultural sciences.

Majority of the agricultural scientists seek the information before starting the project work (23.23%), during research work (18.98%); and during project work in progress (14.73%) which are followed by during writing an article/book (14.45%); before preparing special lecturers (13.88%), while other purpose (1.70%) emerged as the least one. This may be due to the fact that research agricultural scientists need the special information on such matters as project planning, decision-making, problem-solving generation of new ideas, policy-making, validation of methodologies, transfer of technology, fertilizers, manure, nutrients, yields, storage and preservation, plant protection, pest control and management, plant diseases control.

They also are in need of chemical application integration pest management programmes, weed and their control methods, growth regulators, soil conservation practices, soil resources, soil erosion and management, irrigation engineering, energy, fuel, farm management, water management, farm implements and machinery, farm appliances, meteorology, solar energy, oceanography, rainfall, natural organic farming, insect pest management.

Besides the above mentioned factors others include production economy, farm credit, labour, rural development, extension education, food preservation, food microbiology, textile, animal diseases, veterinary medicine, pharmacology, sericulture, bee-culture, forestry, rodent control, post harvest technology, shifting cultivation, land utilization. This findings is almost close to the findings of Subbaiah (1982), on agro-biological based upon users information needs. Further, in 1989, he further advocated that information needs of agricultural scientists fall under two group viz 1. General needs. 2. Specific needs on the basis of specializations.

Besides the above, further and new challenges are offering vast scope and opportunities such as technological upgradation to be adopted in
new areas. Another worth mentioning opportunity is the prestigious ICAR awards and other national awards in the field of agriculture, animal husbandry and allied sciences. To name a few, these outstanding awards are Rafi Ahmed Kidwai memorial Awards of agriculture Research; Fakhruddin Ali Ahmed Awards for agricultural research in tribal areas. ICAR Team Award for multidisciplinary research in agriculture and allied sciences. Theses awards aim to promote outstanding research work done by our agricultural scientists in the frontier areas of agriculture research and applying the findings in real farming situations to provide a much needed boost to our national agriculture. However, these challenges are met with the successful application of modern science and technology through constant encouragement and incentives.

The need of information usually arises when it is felt that the existing information is inadequate to cope with the problem at hand. Moreover, agricultural scientists have sources of information other than the library. It is prompted to supplement only when the other sources failed to provide information. The significant finding shows that agricultural scientists of this region felt the need to supplement the existing information (61.22%) due to lack of reliable information (35.72%) at the time of starting the research projects and other related factors (3.06%). The reason may be due to information flood; remoteness of research centre/station; non-availability of relevant sources of information, literature; unsystematic bibliographical control, incomplete search record, inadequate reporting of research in India, language problem, etc.

The extents of information is primarily governed by time available (89.07%). other factors in increasing importance are purpose of information (69.04%) resources available (60.18%), up to date of information (50.82%) and amount of information available (42.48%). This may be due to the fact that agricultural scientists in this region are spending maximum time in conducting adaptive research works in laboratories, field observations and participating in farmer's field for trial, with an objective to get reliable feedback
for further intensive study with an intention for advance specialization for
the technology. Therefore, time factor is the essential tool for searching the
information. Sethi (1990) with the help of weightage index found that purpose
of information search (2.02) emerged as the most important factor that
governed the extent of information search by social scientists in India followed
by other factors such as amount of information available (1.81); resources
available (1.76); time available (1.56); up-to-date rate of information (1.47);
presentation of information (1.31) and cost of research (1.28) in decreasing
order of importance.

Agricultural research scientists of North Eastern Region despite
spending a considerable time and efforts are likely to miss useful information
as the literature continues to expand beyond his search capacity. However,
when the information requirements are not fulfilled hopefully, they contact
the information scientists (68.66%). Only an insignificant number changes
their information requirements (65.00%) and change the search strategy
(5.34%). The fact may be that the information scientists play a vital role and
act as middle men serving as a link between the producers and users of
information. They are involved in varieties of activities such as generation,
collection, processing, organizing and dissemination of information according
to the users requirements. They play a crucial role in the information according
to the users requirements. They play a crucial role in the information transfer
process. Further, they provide quick and adequate information for the users.
Their principal functions are analysis, synthesis, consolidation and repackaging
of information on behalf of the users, filtering information needs, identifying
specific unique research needs, etc. In addition to the above, information
scientists are well documented in the field of information handling either at
local, national and international levels. One study indicated that 30% of scientist
manpower is wasted because the right information is not available to the right
person at the right time. The information scientists' role is to bridge this
growing needs (Patel and Joshipur, 1997). The scientists need correct and
speedy information to realise the gold on line. With this objective in view.
information scientists has to undertake the following tasks; Identification of the project, users' profile creation, preparation of questionnaire to develop project profile, undertaking the various facets of the technical subject with the help of senior scientists. Modification of users' profile so that specialized services can be provided. These include content page service, supply of current periodicals lists, identifying journals fulfilling their exact needs regularly, delivery of physical documents to the users, delivery of copies of available articles, locating the source or supplier of the material, transmitting the request of information needs, verifying the request if necessary, receiving the materials and delivery of the materials to the users.

Project meetings with project heads/Scientists including visiting the scientists work place and laboratories to gain more knowledge about their project and its ultimate users were taking place. This opportunity was also utilised for discussing users' profile. Higher priority should be given to projects with critical time schedule. This service can increase their creativity, productivity and efficiency and can prevent waste for unnecessary duplication of research. It can accelerate the project work and quick and right decision can be taken. Evaluating the effectiveness and efficiency of information services offered by the information scientists to the users determines how well an information service satisfies the need of the users.

Agricultural scientists are subscribing to their own periodicals in their respective fields of interest. Apart form the above, they are heavily engaged in laboratory work, field observations, trials and transfer of technology to the farmers. They, therefore, visited the library only sometimes (65.96%) for their information needs, perhaps for pinpointed, accurate and relevant information in their narrow areas of researches, cross-reference citations, bibliographical reference, evaluation of feedback received from farmers for further specialisation. Others visited library everyday (34.04%) to read newspapers, up-grade their knowledge, up-to-date their information, update their requirements, current research information. This strongly indicates
that library is the heart of research. Accordingly to a study conducted by Mahapatra and Panda (2001) in a state like Orrisa about information needs of the working journalists clearly depicted that the majority of them need information almost daily so as to make their feature writing and newspaper reporting more lively and effective, besides improving their professionalism through the use of library and information centre then any other means which is certainly a healthy sign. Prasad and Tripathy (1998) found that the 11.11% of physical scientists and social scientists visited the library daily. Just 22.22% of physical scientists and 11.17% of social scientists visited the library once in a week. The figure shows that social scientists and physical scientists were not very regular in visiting library. Sasikala in 1994 pointed out that the purpose of visiting the library may vary depending on the levels of managers for information needs. More frequent visits to the library by the junior manager than the other two levels may be mainly for reading and borrowing. The requirements of middle managers were mainly for consulting reference source and as expected the higher number of senior managers needed scientific piece of information.

Reasons for not visiting the library regularly may be reading materials are not up-to date as found in the survey with 61 frequency (33.33%). This is in conformity with the findings of Subbaiah (1989) who stated the agricultural Scientists in India experienced bottle necks in literature search. The most serious bottleneck was that the information available in the library were not up-to-date and complete. This is followed by the reading materials which are not in good number with 40 frequency (21.85%). Similar results were found by Sethi, Ramesh and Sahu (1997) which states that greatest concern as well as dissatisfaction of users has always been linked to the reading materials. This is followed by library timing which is not convenient with 25 frequency (13.67%). Baruah (1981) reported that readers in both Gauhati university and North Eastern Hill University could not use more time in library because of restriction of library hours. The other factors are reading materials are not in organised form with 21 frequency (11.21%), no proper information
retrieval system with 21 frequency (11.48%), non-conductive library atmosphere with 8 frequency (4.37%) and library staff not being helpful with 4 frequency (2.18%). Reasons may be due to shortage of resources, the reading materials can not be procured to meet all the exhaustive needs of the scientific community. Library timing can not be extended and environmental factor is also one of the main hurdles. Communication facility is another factor which delayed the arrival of publication.

Library staff are not co-operative (60.45%) to share the responsibilities for meeting the information needs of the agricultural scientists working in the region. Only 39.55% the agricultural scientists as a whole thus get co-operation from them to a lesser degree. This can be attributed that they are not professionally well trained (45.45%) in this particular field. They do not understand the information needs (35.35%). They are unable to catch up with the complexity of the potential requirements and they do not understand the objectives and approaches of the potential users. Other reasons are lack of knowledge to assess special bibliographical tools in particular areas of interest, non-availability of the required document within the users' reach due to wide and varied information sources. Moreover, they are unable to attend seminars workshops conducted by resourceful organizations from time to time. The concept of co-partnership between the user and the library staff in information search is still not duly recognised. Khan and Simons (1995) found that library staff interactions with readers are not satisfactory and hence needs improvement or change in a study conducted on the use of library resources by the Lady Post Graduate students of Mangalore University. This is creating a gap of interpersonal communications. However, they are unable to provide effective personalised services based upon proper redefined information needs. Therefore, they are not co-operative (12.12%) as well as communicative (7.08%) respectively.

Majority of the research scientists of North Eastern Region are using reference services (50.36%). This may be due to the fact that it directs
the user to the sources where information is available, it offers bibliographical research for the clientele. It also provides assistance in locating specific documents so that one may get the information on a particular subject. Besides, it provides a direct contact with the user's information requirement and information gathering. Devaranjan (1989) mentioned that in pure science, majority of the users expressed that they utilised reference service from the library. The second familiar service to some extent are bibliographical documents services (47.14%); Current awareness service (42.48%); loan of books (40.49%). Selective dissemination services (36.54%) generally refer as secondary services. Users are also aware of other library service such as on-line service (21.78%), Internet services (14.82%) and translation services (8.16%). But these services are not extensively utilised by the users. Perhaps these services are still in the infancy stages, inadequate infrastructure and information consciousness are still at a low ebb in this region. However, translation services in this region is still a distance dream.

Because of specialisation in their respective disciplines, Scientists are participating in book selection process (64.49%) which is one of the best exercises before procurement of reading materials. Selection of books has been carried out thoroughly because only useful books with renowned authors related with their research works, of latest edition have to be taken into consideration for priority, so as to avoid wastage of resources. In addition to have a balanced collection of reading materials. Their participation may be soliciting their suggestions for new book, by inviting them to book exhibitions organized specifically for the purpose. The material thus acquired is likely to be more in use than the other acquired without the reader's knowledge and consent. This may guide in procurement of reading materials with less efforts. normal price, accurate and prompt supply where as 35.51% do not participate at all. perhaps due to non-availability of time as they are engaged in other research activities.
Agricultural scientists delegated information search to research assistants (32.28%) and students (31.50%), because they are newly enrolled in the field of research project works. They have to be well acquainted with the relevant literature in their areas of research. Next followed documentation Officer (26.38%). Besides being a specialist having specialized background in wide subject aspects, he is, therefore, well acquainted and equipped with various techniques in retrieving and disseminating the specific and tailored made information to the designated users. Delegation of information search is also designated to junior/senior associates with 9.84%. This reflects well upon their background experiences.

(2) INFORMATION CHANNELS:

It is quite interesting to note that the agricultural scientists of North Eastern Region mostly prefer to build libraries of their own with 71.53%. This means that building up a personal library collection is by purchasing of publications (60.74%) as the prime source of reading materials. This testifies to better financial resources available to scientists. Joseph (1995) reported that personal collection seemed to be an important sources of information for journalists. This indicates that most of the journalists have the habit of purchasing essentials reading materials. Other sources with 20% are through attending seminars workshop symposia; another by becoming member of renowned journals published by different institutes/Societies and through colleagues of the same discipline. In the light of the above, it is evident that there are significant variations among them in employing different sources for obtaining reading materials such as by gifts (10.37%) and exchange of publications (8.89%) through contribution of research paper in books/Seminars and exchange of reprints.

However, the study has clearly established the trend that scientists prefer to buy reading materials and getting other materials through other sources, and to build personal libraries of their own extensively (86.46%)
so as to effectively satisfy their day to day information needs. Thus, they seemed to have the desire to become more independent in their own reading materials including text, reference sources, periodicals, etc which they frequently need for their requirements. This is in conformity with the findings of Mahapatra and Panda (2001).

Institutional library (66.68%) much to be agricultural scientists than any other channels put together in their search of information. A library is a storehouse of knowledge. It is laboratory to the applied science. It is well equipped library with good collection of retrospective and current reading materials, reference sources. Any problem arises, scientists can approach the librarian for a solution. Institutional library is the connector between user community on one hand and the world of intellectual activity on the other.

Research scientists of this region are members of both institutional library and other library with 48.35%. It may be noted that one can make in-house use of the library reading materials of effectively meet their research needs. The study has clearly shows that scientists depend on institutional library and departmental library for their research requirements to supplement their missing information of their specialized area of research whereas 51.65% of the agricultural scientists are not member of libraries other than institutional libraries. Perhaps they are satisfied with the available information resources in their institutional libraries and additional good personal collection.

Agricultural scientists are attending conference and seminar extensively with 65.04%, 24.39% to some extent and 8.94% to a lesser degree. This is the platform where they can express, exchange views, opinions, research findings, results and experiences with members of their fraternity. Interaction with resourceful senior scientists not only enrich their present knowledge but also widen extensively in the area of research.
Agricultural scientists of this region are not all satisfied in their information needs by conversation and discussion with colleagues (56.15%). However they collectively depend on library collection and services available in the institutional library and departmental libraries. Whereas 20% are satisfied to some extent: 13.07% extensively and 10.76% to a lesser degree. Perhaps, very often conversation and discussion with colleagues took place on the same ideology. This approach provides an available source of information meeting unsolved solution, planning and design research results.

Majority of the agricultural scientists are not using on-line network service (56.16%). This is indicative that on-line facility is not available to them. Senior scientists do not possess much computer education. Therefore, they are not much interested in utilising the facilities available. So user education and orientation programme is required for effective and efficient use of library services. While 20% are using this services to some extents: 13.07% extensively and 10.76% to a lesser degree for their information requirement. This may be due to the fact that younger scientists are having extensive computer education background during their training programmes.

Most of the agricultural scientists are not using internet services (53.04%). Problems are lack of computer orientation and inadequate computer facility. However, 20.87% are using to some extent, 16.66% to a greater extent but (10.43%) to a lesser extent. This may be due to the fact that few of them are having good command in the search strategies. Further, the present study has thrown much light that hard facts of science and technology are much available due to some limitations, badly working of telephone, frequent drop of electricity, lack of sufficient resources, not facilities for advance training and lack of co-ordination and co-operation between computer scientists, librarians and information scientists. This findings point out the need to expose users to all hardware, software, search tools and other equipments. It is also necessary to provide sufficient computer terminals for their users, in order to meet the challenges of ever increasing information
needs in the field of agriculture. Therefore, they need to have widespread use of information available on various media.

Agricultural scientists of North Eastern Region depend much on field trips as source of information (34.83%) to a great extent, 29.85% to some extent and 18.66% to a little extent. Perhaps, it may be for specific information, data collection, etc. through the techniques of participating observation. Only few are not availing this facility (17.16%). Reasons are not mentioned. Quite often they are also avail of this facility within India (75.88%) and outside India (55.84%), for the purpose of gathering information on their research activities. Other purpose is to perfecting one self before one's fraternity, adding to one's tally of research paper presented and also for cultivating acquaintances with other specialists for mutual benefits. However, because it is a practical oriented professional subject, field trips are playing an important source of information.

(3). INFORMATION SOURCES / SEEKING BEHAVIOUR.

Agricultural scientists of North Eastern Region superlatively make use of periodical articles (65.25%) which is closely followed by books (64.75%). Periodicals publications are characterised as the primary sources of information meant for wider communication of research works. This is in conformity with the findings of Kaula and Singh (1980) who stated that ration of use between periodical and book in psychology is 63.3:37.7. While 59% located references for further research in the primary materials itself i.e some book and journals as reported by Agarwal (1989). They also make use of government documents with 51.97% and 51.57% of conference & proceedings respectively to a certain degree. These are considered as the authentic sources of information for research projects which furnish productive suggestions for future line of research. Next is followed by basic information sources with 46.61%. Perhaps, these sources serve as valuable information such as technological practices, transfer of technology and technological
progress in production techniques which are the continuous flow of new technologies filtering through research and experimentation. Comparatively, dissertation & theses (43.85%), and newspaper clipping (43.31%) are also used to some extent since they serve as importance sources of research materials for research scientists. Similarly, annual reports reviews with 42.52% are also used by the agricultural scientists of this region because they provide evaluative literary work of research projects. Apart from the above, they also make use of technical bulletin 41.67%, patents and standards (41.02%), technicals reports (40.57%), other sources (40.24%) respectively for they serve as the tools for specific solution particularly for technological problems relevant to their research works. In addition, book reviews (39.10%), survey reports (39.2%), manuscripts (39.53%) are also used to a lesser degree as they are important media for research development activities. They also make use of indexing and abstracting services with 34.21% for the purpose of retrieval of information. Agarwal (1989) pointed out that 33% of the respondents used abstracts or indexes by the social scientists of Indian context.

The extremely useful material used by the agricultural scientists of North Eastern Region are current sources (69.18%) which represent new knowledge, first hand, up-to-date and newly generated information, for instance journal articles, special category of document. However, a new information may generate a new idea particularly beyond his information and can give a trend in this in his research activities. These priority sources are being published by several research organization meant for research works. This is followed by retrospective sources (47.5%) as the most useful source such as back issues of journals, old publications which generally referred to documents which are published in the previous year; secondary sources (46.22%) and tertiary sources (45.87%) are moderately useful. This may be due to the fact that secondary sources facilitate access to information contents of primary sources. Before carrying out research on new projects researchers scanned these sources to become aware of the present development. Therefore, they mostly prefer to go through them which give a bird's eyes view of the recent
trend of the subject. However, they are regarded as important sources of information to keep them aware of the retrospective and recent advancement in their respective fields of specialization. They help to assess and identify new areas of research. They diminish the probability of duplication of research with the already existing knowledge. Thus, save time, energy, efforts and money. Further, agricultural scientists consulted secondary sources to keep a relation with the previous works, graphic representation of any event, activity or condition past, present and future. They also used to get and add some previous information of earlier works related to new research works. Tertiary sources are essentially aids to facilitate the use of both primary and secondary sources. They exist in the form of dictionaries, bibliography of bibliographies. Primary sources (44.54 %) are also the most useful material because they provide new pieces of information to researchers at different stage of research works. They facilitate awareness of the new development in and around of research work and enable to get acquainted with latest techniques or state-of-the-art.

Own personal collection (57.14 %) is found to be extremely useful because of collection of literature in the field of interest through attending conference & proceedings, siminars, summer institutes, workshops, etc,. Saraf, Binwal and Misra (1990) revealed that personal collection scoring slightly higher value than institutional collection. This reflects well upon the habit of purchasing books. It also indicating the better financial resources available to research scholars. However, such collection is of immense use for immediate needs. which is followed by Central library attached to institutional (49.62%). It is an established fact that the Central library is the backbone of any institution which rightly called the 'Ocean of Knowledge'. It is also found that library attached to the department centre (48.03%) is also extremely useful because if a scientist is a member of any professional society, in that cause he is likely to acquire some of the publications which may lead to less dependence on the library for the consultation of the materials. Further, personal collection of colleagues, supervisors, superiors (44.86%) and other libraries of the
locality/places (39.06%) and documentation/information centres (35.54%) are moderately useful. Reasons could be due to limitation of resources available or they go personally to other libraries to consult the literature which was not available at all or request a friend to get it for him.

Own effort (93.33%) is the highest mode for collecting information by the agricultural scientists of North Eastern Region and least dependable to junior colleagues (54.37%). This reflects well the scientists experiences which play a major role and only when there is any vagueness than he leads to take help for improvement of the results. This is followed by through colleagues (48.39%) for collection of factural data, documents/literature and latest references on specific topics. Agricultural scientists take help from the reference librarian (44.71%), part-time research scholars (42.11%), references staff (41.31%) perhaps for retrospective or exhaustive search of document/literature, state-of-the-art and review part. While involvement of the boss of the department (30.77%), full-time research scholars (29.17%), students of the department (27.56%) are of least degree.

Of the various sources of information used to consult frequently for specific information, article in journals (86.62%) emerged as the highest followed by research reports (58.89%), annual review/report (55.47%), abstracting journals (50.37%), library catalogues (46.85%), catalogues of book sellers/publishers (43.10%), government documents (42.86%) which are also consulted occasionally by the agricultural scientists of this region. This may be due to the fact that these sources ensure free flow of information designed for selective audience. They are able to meet the specific requirement of the users. They also provide vital link to researchers who are constantly involved in research projects and in bringing about technological transfer effectively to solve multiple problems. Thus, it represents the highly useful sources for communication of information to agricultural scientists. Others in decending order include book/monographs (38.46%), statistical publications (37.84%), conversation with colleagues within the
The agricultural scientists of the North Eastern Region are deploying the various sources of information for the purpose of keeping themselves up-to-date in their research works. It was found that articles in journals (76.47%) are the heavily used sources because they serve as the primary sources of research achievements followed by annual reviews/reports (53.34%), book/monographs (55.5%), abstracting journals (52.00%), research reports (46.79%) respectively because these sources stimulate new ideas or novel thoughts. They keep the scientists abreast the latest current of the current developments in their respective areas of specialities and inform the fellow scientists of the recent developments. They play major role by alerting any piece of literature relevant to their research activities. Other sources are attending lectures, conferences, seminars, etc., (43.64%), catalogue of book sellers/publishers (42.48%), other sources (40.62%), book reviews (40.62%) are also used extensively. However, it can not be denied that these sources are the carriers of information. The rest in desending order are as follows: indexing journals (29.83%), discussion with reference librarian (39.39%), conversation with colleagues within organization (38.18%), reprints from authors (37.37%), conference & proceedings (37.39%), library catalogue (37.37%), government documents (36.76%), Newspaper clipping (36.19%),
The findings further reveal that the agricultural scientists relied upon various sources to obtain information. It also displays that they are extremely dependent on the literature available to them.

For background information, different sources are used by the agricultural scientists in their research activities. These are as follows: book/monographs (61.47%) are the most sought for materials followed by annual review/reports (52.71%), article in journals (48.62%), research reports (48.22%) respectively. These sources help the researchers to have the bird's eyes view of the progress of the work or help a worker to take decision in the changed situation while abstracting journal (46.03%) are meant to satisfy the exhaustive approach of the users and help to introduce the right sources of information to the readers. Further, library catalogue (43.75%) served as an efficient information tool for information retrieval whereas conversation with colleagues outside organization (43.69%) provided quick answer. Statistical publications (42.57%) contain valuable data generated from several primary and secondary sources. Catalogue of booksellers/publishers (41.38%) serves as a source of information where product information is disseminated prior to its publications in journals or other form of literature. The present finding is in line with the findings of Chottopadhyay and Rohwani (1984). The rest in descending order are listed below: dissertations & thesis (39.84%), government publication (38.18%), conference & proceedings (37.38%), trade literature (35.96%), discussion with reference librarian (35.85%), conversation with peers (34.02%), attending lectures, conference, seminars etc., (33.93%), newspaper clipping (33.66%), indexing journals (33.61%), discussion with information scientists (31.25%), reprints from authors (28.70%), other sources (27.27%) and unpublished sources (27.00%) which are the least used ones. However, agricultural scientists consulted these sources of information in order
to make new presentation more informative in their projects and to supplement with information when similar studies/problems arise.

(4) **INFORMATION SERVICES.**

Precisely the library's role is to ensure that the information resources are effectively organised in such a way that the present and future needs of the users are satisfied. The table enumerates that the clientele in this region are well satisfied with the **reference sources** (57.14%). This focuses that reference service is another important service offered in the library. It is a personal service rendered by the library staff to the users in the use of library resources. It involves all those activities for establishing contact between the right book and the right reader at the right time. This section is expected to hold all the important information resources both general and specialised subject areas to provide the required information to the users. It also guides users in locating the document/information without loss of time. This is closely followed by **newspaper clipping services** (56.69%). This reflects that newspapers play a vital role in highlighting research and development in different stages in the field of agriculture. Besides being an effective carrier of nascent information, it also serves as instant awareness tool in various disciplines of agriculture sciences. It is one of the popular media to cater to the need of the agricultural scientists pin pointedly. Newspapers carry current information to disseminate it widely because of public demands on it. Prodhani (1982) reported the findings of his survey on the importance of press clipping services in agricultural research library. This survey confirms that a systematic press clipping services could be very useful for agriculturists. He further writes that the press clipping service offered by the library was appreciated by all the agricultural workers. The press clipping service includes scanning of important daily newspapers for important agricultural information and clipping and preserving them for use. The press clippings are classified and displayed for quick retrieval. A catalogue of press clippings are also maintained for their quick locating. Panda and Karisiddappa (1993) explained that a good
library with press clipping and other newspaper services is always invaluable to its researchers and it keeps tract of the paper clips from prior stories along with other useful documents.

It is also noted form the study that some fo the available library and information services did not satisfy the information needs of users community. One of these non-use of on-line network services (82.16%). It reveals that on-line network has been of recent development and it is in its infancy stage in this region. As such, most of the users are unable to search the information due to non-availability of facilities. Technological, intellectual, funding and local constraints are the major bottlenecks. This is followed by non use of additional lists of services (73.32%). to name a few is trend analysis reports, alerting services, lists of additions, anticipatory documentation lists, news briefs, state-of-the-art-reposts, trend reports, technical digests. Selective dissemination of information (66.67%). inter-library loan services (62.31%). Xerox services (61.31%), current awareness services (58.65%). bibliographical services (50.77%), current contents (54.20%) respectively which may be due to limited budget, lack of well defined policies, rules and norms. no suitable bibliographical organization, complex nature of publications, complex form of documents, shortage of trained personnel. Majority of the libraries in this region does not have up-to-date equipment and facilities. Official delay in providing consumable items, non-availability of spare parts in the local markets to serve the needs of the users are the main reasons. It can be assumed that most of the libraries in this region have not developed effective information dissemination mechanism that is best suited to the needs of their users.

Agricultural scientists tried abstracting journals (69.92%) when seeking information. Perhaps this indicates that abstracting journals provide citation, subject approach and valuable information to users. They record the papers communicated in several national and international seminars, conferences which are recent in nature. They ensure that the research scholars
do not miss any worthwhile information generated within the country and in other developing countries. They disseminate research findings, information pertaining to agriculture without much loss of time. They are reliable sources which regularly publish abstracts of important articles covering the wide field they are devoted to.

This is followed by **book sellers/publishers catalogue, trade literature (54.78%)**. These sources serve as a guide or tool to agricultural scientists to select the needed materials with just a fraction of the information for their fruitful pursuits of their researchers. They provide an opportunity to select the required document for their research needs. Van Styvendaele (1981) stated that pure scientists/technologists in particular are in great need of information about recently published books which are obtained first by scanning promotional materials and book sent by publishers and book sellers and second from periodical and monograph literature references, whereas Ellis (1989) pointed out that the use of publisher's catalogues for monitoring publication in book form has its complement in extracting correct information. For many of those interviewed, publisher's catalogues were the primary sources of references and identifying material through them as a major aspect of their information seeking activities. **Library catalogue (54.47%)** is another useful source employed by agricultural scientists when seeking information. It discloses the holdings of a particular item on particular subjects. This signifies that library catalogue is a key to library resources. It is an essential tool for information retrieval. In addition to its role as information storing device or inventory, it also assist in disseminating at a later part that particular information stored in it. Moreover, it is an efficient information tool for research scholars.

This is followed by **discussion with reference librarian of other libraries (54.31%)**, **discussion with colleagues within organisatin (50.78%)**, other sources (48.57%), discussion with information scientists of one's institution (47.58%), indexing journals (47.11%), discussion with reference
librarian of one's institution (46.15%), discussion with colleagues outside organization (45.96%), consult supervisor (44.64%), discussion with information scientists of other libraries (41.74%), consult peer in the specific field (39.32%), respectively. Thus, it signifies that researchers rely on colleagues, associates, peer to bring other useful materials to their attention. In this way they keep each other up-to-date in their field of research. Depending on the nature of work, research projects, research scholars are sharing the information between the giver and seeker of information. Which ultimately save a lot of time. However, it provides a trigger for further thinking. Thus, it generates ideas for better application of information in a specific field of specialization. It also serves as a fruitful information exchange tool for keeping abreast of recent development in their disciplines. The informal communication channel through contact with others concerned with the same subject fields or working in the same areas or through contact with immediate colleagues of other institutions, libraries serve as a catalyst to sift and filter the information. Thus, it protects the enquirer from information overload. Sridhar (1989) clearly points out that there is a sort of cross fertilization of information or ideas that stimulated the activities of a person of different specialization and fields of activities. Moreover, the interpersonal exchange with colleagues has been found to be the most effective mechanism of information transfer. When the actual information is not met, they seek other sources such as newspapers, pamphlets, magazines, technical journals, book reviews, domestic journals, indexing journals rarely so as to supplement their information needs and to review the progress made in the specialized field during that particular period or of other reasons not known.

Sen and Prasad (1992) states that the experts act as ready reckoners and provide the quick answer. In spite of the availability of relevant sources, the particular viewpoint sought may not be satisfied. In such a situation, it is only the experts that can quickly look at the problem from the viewpoint of the seeker to provide appropriate information. Thus, individuals retain their importance in the changed environment through in different ways. They further
stressed with the experts in various fields because of their deep involvement with the subject and rich experiences to interpret and pass value judgement. Such information is most valuable, condensed and manageable. The expert's observation, experiences may help one to directly collect data or information. Thus, he can act as direct source of information. More often his views and forecasts act as guidelines for decision making. The judgement could be on technical soundness, feasibility, viability of a project, quality of the products, professional competence of a person, etc.,. Such experts are indeed indispensable sources of information wherever value judgement is involved. Further, experts advice is sought while making judgement regarding quality, utility, novelty, feasibility, etc.,. This sort of advice is considered indispensable while formulating S & T policies, making critical assessment of products, processes, methods, mechanisms, machines and fellow scientists. Being members of several committees and commissions they are usually well aware of the new directions as well as new vistas of research.

Abstracting and indexing services help the scholars to know about all items published in their areas of interest and select only what are most relevant for detailed study. Besides, they are precisely meant for more specific areas of study as they not only reduce the time lag but also provide access to information at considerably lesser cost. Amongst the various indexing and abstracting services available in the libraries of North Eastern region, the table clearly shows that the agricultural scientists gave higher priority to Current Contents (54.13%). This projects that Current Contents provides access to the tables of contents of the latest journals published in specific areas of research. Due to broad coverage, comprehensiveness and exhaustiveness, it serves as indicator in locating the specific information vital to one's professional needs. Moreover, it is easy to scan the pinpointed literature published in the field of agricultural, biological, environmental genetics and veterinary sciences. Not only complete bibliographical information is provided but also enables to quickly locate the information on a given topic. It also provides easy access to primary resources. This is followed
by other sources, namely Agricultural Economics Abstract, Agricultural Engineering Abstract, Agricultural Extension Abstract, CAB Abstract, Irrigation and Drainage Abstract, Journal of Soil Water Conservation, Review of Plant Pathology, Review of Entomology Abstract, Genetic Abstract, Soil Fertilizer, Soil Science, Soil Science Abstract, Forest Abstract, Soil Conservation Abstract, Social Science Abstract, Soil tillage Abstract, Soil Science Society of American Journal, Technical Publications (53.70%). This strongly reflects that the above mentioned services are extensively covering much of the needed information by the research scientists. Further, they are generally designed as a tool to satisfy an exhaustive approach to information users. Literally, they serve as sign posts to the primary literature at the time of taking up new research project or study. Whereas the rest services such as Biological Abstract (38.53%), Indian Science Abstract (31.07%), Medical and Aromatic Plant Abstract (30.77%), Field Crop Abstract (29.03%), Seed Abstract (27.78%), Agro Forestry Abstract (27.55%), Rice Abstract (27.78%), Agrindex (26.14%), Nutrition Abstract (25.51%), Weed Abstract (25.51%), Horticultural Abstract (23.66%), Entomology Abstract (21.68%), Plant Breeding Abstract (20.88%) are sometimes or occasionally consulted. The least consulted ones are Herbage Abstract (17.24%), Helminthology Abstract (15.22%). Perhaps, cost factor, unavailability, late arrival are the main reasons. The UNESCO Adhoc-Committee on Social science Information (1977) left that insufficient awareness of available data or sources are often the major problems. Therefore, lack of use of indexing and abstracting services which are retrieval tools suggests that library users need instruction as how to search information.

(5) INFORMATION BARRIERS / CONSTRAINTS.

86.05% of the agricultural scientists of North Eastern region experienced maximum constraints. These constraints are of the following nature.
(i). *Shortage of resources (61.48%)*: This is the most prominent barrier in information needs of the researchers, scientists, technologists, agriculturists, etc. It includes financial constraints for purchasing a wide range of primary sources such as scientific books, learned periodicals, specialised research journals, technical reports, patents and standards, bulletins, technological publications, etc. which are essential for research purposes. It not only puts hindrances for attending conferences, seminars, workshops at various national and regional levels, but immensely puts constraints in research findings, design research results and fruitful interaction with the individual experts, specialists in a particular field of specialization.

(ii). *Lack of abstracting journals/reviews/interdisciplinary nature of literature (50.00%)*: Agricultural literature is complex, vast and it is inter-disciplinary in nature. Therefore, the range of literature which is of potential need to agriculturists is extremely wide. Many Indian journals are not covered in international abstracting journals. Therefore, agricultural university libraries and other research institutional libraries have started their own indexing abstracting journals without any co-ordination and standardisation. This resulted, on the one hand, in overlapping in coverage, leading to wastage of money and man power and, in the other hand, leaving some disciplines uncovered.

(iii). *Lack of connectivity through on-line and internet to outside world (48.30%)*: In North Eastern Region, most of the libraries are still behind in the field of modern information technology. Constraints may be recapitulated as follows: the use of computer underwent a rapid technological development; budgetary constraints does not encourage and motivate the libraries in this venture; libraries have inadequate physical facilities, e.g. manpower, etc, lack of training of library staff such as professional conferences, seminars, workshops where they can get better exposure to new vistas of library and information technology. Role of government policies, objectives and guidelines ae not conducive to implement
successfully. Complexities of search engines; lack of sufficient computer facilities and users are not exposed to all hardware, software, search tools and other equipments. Lack of awareness of what is available and where and how it is located. Users do not know the various options available in on-line system; therefore, they cannot retrieve documents effectively. Frequent current failure is another problem. Nair (2002) stated that the major problems were lack of search expertises (51.47%). Another factor worth mentioning was the difficulties in getting connectivity (30.88%) and lack of computer orientation (26.47%) on the impact of modern technologies on the information needs and use pattern of the technology.

(iv). Non-availability of information sources/ information centre and communication centres (41.03%): The growth of information is at exponential rate. It is estimated that the quantity of existing information doubles every ten years. However, it is impossible for any library, even with generous funding to acquire every item of information. Also a user cannot go through every information source on his or her chosen topics. Lack of information and communication centres in this region due to geographical isolation, coupled with dearth of transport communication facilities to have access to different sources of information has become a great problem in accessing the relevant information. The solution demands two things: the user should be provided access to every source of information and there should be a system of management to choose the most relevant item. Ravindran (2002) pointed out that Indian libraries depend on foreign sources for more than 70% of their requirements, particularly in the field of science and technology. The problem is two fold: increase in the prices of information sources coupled with the frequent devaluation of the rupees against most of the foreign currencies. This kind of increase in the cost of information sources has made libraries of all kinds to limit the acquisition to the most essential item of the limit of acquisition was determined by the fund available. Budgetary restrictions and increase in the cost of information sources limits to information access. Thus, the problem of information explosion and increase in the cost of publication could be necessarily tackled by inter-library co-operation.
(v). **Lack of utilisation of information technology to retrieve information (34.17%)**

No doubt, information technology facilitates a variety of information sources, up-grading information resources in order to add value to their services and to satisfy the changing information needs of the user community. But this technology is still in the embryonic stage in the North Eastern Region. One of the main reasons is the development of a large number of library softwares which has made the choice difficult as everyone claims superiority over the other in some respects. Evaluating of library softwares is a complex job. Non-availability of suitable software; lack of trained manpower; lack of financial resources are some of the problems. However, plants are now a foot to step up to this technology in the near future. Lal (1993) stated that in ICAR Institute libraries (65%) and SAU libraries (82%) did not claim to have any computer application. This pathetic stage is due to the following: a) poorly arranged libraries  

b) lack of agricultural information system of agricultural libraries network  

c) lack of national agricultural information policy: while Havaru (1993) emphasised that development of library automation system have been successfully developed only for specific environments. Commercial software packages are still oriented mainly to be used by Indian information scientists and not by the end user. Integrated library management software packages in India are missing. DELNET and CALIBNET are in the initial stage of development and experiences gained by these libraries will undoubtedly be very valuable in similar networks which will be taken up elsewhere in the country; whereas Sharma (2000) presented that in India there are very little efforts in the direction of introducing these technological developments in the academic and public libraries. This may be due to i) lack of motivation and awareness on the part of the library managers. ii) non-availability of skilled personnel, iii) lack of training opportunities to handle sophisticated tools and machineries and v) financial constraints.

(vi). **Vastness and fragmentation of the area for studies (34%)**

Remoteness of the entire region coupled with the inaccessibility to various
parts of the states has poses an impediment for the researchers/ scientists to conduct extensively the research works in various fields of specialisation. Therefore, to provide with all the resources to users, networking will have to be evolved.

(vii) **Lack of resources to library materials due to library rules/procedures (33.38%)**: Current agricultural resources in most of the libraries in this region such as current journals, scientific books, research reports, etc., are inadequate to meet the changing needs of the users due to stringent rules/procedures. Besides, books and journals published in Europe and America are too costly for the libraries in the North Eastern Region. Agricultural Scientists require other literature such as conference proceedings, seminar papers, other official documents, etc.,. These documents are difficult to be procured as they are brought in limited numbers and there is hardly any agency that stores and sells them. Therefore, to provide all the exhaustive information sources particularly to researchers, sharing of resources with regional/national centres will have to be evolved. Seth, Ramesh and Sahu (1997) stated that the greatest concern as well as satisfaction of users has always been linked to the reading materials. Overall collection of the library is not adequate.

(viii). **Information is scattered in many sources (32.07%)**: As the sources of information proliferate at an exponential rate, information relevant to specific topic of interest to researchers/scientists are also getting scattered to thousand of sources. This necessitates consulting numerous sources to collect exhaustive information on a particular topic. Even large libraries can provide complete access to sources to facilitate exhaustive approach. Therefore, bibliographical control of teh available literature at national, regional levels and documentation techniques to select and share the resources at various levels with have to be evolved.
(ix) Slowness of publication (32.07%) : The delay between the origin of an idea and its embodiment into primary sources on the one hand and the delay in accessing the required information through manual methods on the other hand are real barriers to communication. A journal article before getting publishing is necessary to send the paper to the experts in the area for comments. Then the author has to revise the paper on the basis of the expert opinion. Even if an article is accepted the paper has to wait until its turn come in the publication schedule. All these formalities delay the publication. The time lag between the submission of a paper and its publication in a journal very often take more than a year. There is also delay between publication of primary sources and their inclusion in the information access tools such as abstracts and indexes.

(x) Other Constraints (31.05%) : Agricultural scientists of this region experienced other constraints as well but these constraints are not specified.

(xi) Inability or Un-willingness of the institution that control the information to part with it (26.86%) : Various research institutions are publishing information which are restricted for making accessible to users. These information are vital sources for researchers, but they are restricted to share with others. Another worth mentioning constraint is the delay in sanction of leave project/grant which ultimately lead to delay in information search. Researchers has to wait long before the requisitioned materials are placed in their hands. Moreover. the information or current periodicals is also delayed which badly affect the research works.

(xii) Government restriction to access the relevant information (7.27%) : Occassionally. some restriction might be encountered in the matter of release of relevant information by the political party in power In some cases they do not feel the need to make their findings or experiments public or do not have the inclination to make it public or do not get an opportunity to do so or may be out of far of competition or fear of loss of importance and recognition.
(xiii) **Non co-operative attitude of employee / institutional staff / colleagues and reference librarian (6.14%)**: The constraint indicates the unhelpful attitude / behaviour of the library staff in locating the information. The reason may be they do not understand the specific needs of the users. They are new in the field and lack of training. Therefore, training has to be provided so that they can cope with the information needs of the users. Aguolu while examined the staffing in Nigerian university libraries in 1990 found that in library career disappointment may result from such factors as unsatisfactory salaries benefits and privileges, bad working conditions including unhappy work environment, lack of recognition of one's professional services or accomplishments and lack of opportunities for professional growth. One university library with the largest percentage of librarians who felt disappointed with their professional careers also had the highest percentage of respondents who found their work environment alienating.

(xiv) **Lack of time (6.07 %)**: Researchers / scientists are constantly engaged in research activities in the laboratories, field works, observations and participating in farmer's fields. They seldom have time to go through a wide range of information sources. However, the extent of information search is primarily governed by time factor.

(xv) **Shortage of staff (3.45 %)**: This is one of the crucial factors faced by majority of the libraries of this region. In agricultural university libraries on the North Eastern Region neither the 'staffing pattern' nor the 'staffing level' have been given due consideration. This disadvantage in various organizations suffers consideration. This disadvantage in various organizations suffers from inefficiency. This is due to lack of proper staff formula, prospects for career advancement and promotional prospects. However, Human resources being the corner stone in any social service projects has to be properly laid on solid foundation for an emerging dynamic library and information system. Therefore the success of library operations ultimately hinges on the skill and capabilities of the human resources recruited.
6.2.10. Keeping Onselelf Up-to-date:

Advances and reviews provide critical advancement of research in different disciplines and focusing significant development in various areas of agricultural. Agricultural scientist of North Eastern region doing research in interdisciplinary areas are able to keep up with these publications to some extent (61.16%). 30.58% of the respondents depend extensively while 6.61% of them relied to a little extent. The least on with not all (1.65%). This may be due to the fact that these publications provide critical interdisciplinary advancement of research in various areas in the field of agriculture.