CHAPTER-II
Bhosle S.S. and B.B. Gawade (1991), observed that, in bajra based farming system under irrigated condition, the per farm human labour and bullock labour use and application of manures were found to be relatively more in the farming system with milch animals that on the farms with out milch animals. Under rainfed conditions, per farm use of all the resources was al most the same expecting manures, which was slightly higher in the farming system with milch animals, In jowar based farming system, per farm use of manure was slightly more on farms with milch animals. The use of all other resources remained the same in different farming systems in bajra based area. Profit per farm over the working cost (Farm business income) from crop enterprise under irrigated condition was Rs. 13906 and Rs. 11555 on farms with milch animals and without milch animals under dry farming condition it was Rs. 3212 and Rs. 2753 in respect of the above farming systems. In jowar, based area, profit per farm over working cost under irrigated condition on farm with milch animals and without milch animals was Rs. 7148 and Rs. 6249, respectively. Under dry conditions the same was Rs. 2008 and Rs. 1356 respectively. It was observed that per farm resource use profit and income were relatively more in bajra based than in jowar based forming system.

Dangat, S. B., D.L. Sale and D.S. Nawadkar (1991), reported that in the dry bajra zone more than double, male and female days were utilized in case of farming system with livestock component as compared to the farming system with out milch animals, In the case
of irrigated farms, less than half of the male and female days were utilized in farming system without milch animals as compared with that on irrigated farms with milch animals. Similar trends of labour employment was observed in jowar base area. The total family income was Rs. 18389 and Rs. 11164 in the farming system with and without milch animals, respectively.

As regards the jowar base area under rainfed condition, the per family total income of the farming system with and without milch animals was observed as Rs. 10940 and Rs. 8737 respectively. While in the case of the irrigated bajra base area, the corresponding figures were Rs.13074 and Rs.9808. Thus, the study concludes that either in the irrigated or dry jowar base and bajra base area, it is advisable to maintain the live stock, which will help in generating employment opportunities and increasing the incomes of the farm families.

**Deshmukh P.D., D.S. Hange, N.K. Kale and J.G.R. Pawar (1991)**, reported that the proportion of cultivated area in the total holding, the proportion of irrigated area and the cropping intensity were relatively high in the case of the bajra based farming system, as compared to the jowar based farming system. The per farm as well as per cropped hectare use levels of all the resources were higher in the case of the bajra based farming system than those in the jowar based farming systems. Similarly the per farm total production costs, gross returns, farm business income, farm investment income and net income in respect of the crop production activity were respectively high in the case of the bajra based farming systems as compared to the jowar
Based farming systems. From the estimated Cobb-Douglas type of production functions, it was revealed that the production elasticities of gross cropped areas and expenditure on manure and fertilizers were relatively high on irrigated farms as compared to rainfed farm under the bajra based and jowar based farming systems. Under the bajra based farming systems, whereas the jowar based farming systems the production elasticities of bullock labour expenditure of manures and fertilizers, other working capital and gross cropped area have turned out to be statistically non significant. The comparison of marginal value products of different resources with their per unit acquisition costs revealed that there existed a high level of in efficiency in the use of resources under different farming systems. Efforts are therefore, needed to optimum use of individual inputs under different farming systems in order to enhance the income levels of crop production activity. The scope for increasing farm income through resource optimization is, however more in the case of non conventional inputs under all types of farming systems.

Joshi P.K. and N.K. Tyagi (1991), reported that the rate of change in crop yields of important crop viz. rice, wheat, cotton and sugarcane has slowed down in the Punjab and Haryana. In good water quality region the existing production levels were maintained by over exploitation of ground water, contrary to this the poor quality water region were under utilizing ground water and deteriorating the soil health by salinity and water logging. Both the phenomena were undesirable and threaten the production and ecological sustainability. Appropriate
save land and water resources for the next generation.

**Kadian R.S., C.R. Kaushik and Ramkumar (1991),** reported that the economic analysis of different enterprise indicated that camel and cart enterprise was paying Rs. 2960 followed by sheep enterprise Rs. 2537 in Mahendragath district due to suitable agro climatic conditions and more opportunities available for transporting the stones from hills for construction and stone crushing units, while in Kurukshetra district, the diversification has also effected the pattern of income generation. The relative share of wages and services has been reduced mainly due to the creation of additional employment opportunities. The income generated by the new enterprises adopted by the respondents ranged from 15 percent in the case of cow in Kurukshetra district to 44 percent for sheep enterprise in Mahendragarh district. Thus the diversification of farming has a vital scope provided the taking up of new enterprises is accompanied by the creation of the required infrastructure. The animals selected should be of good quality and high yielding. The goat enterprise should be taken up in Mahendragarh district. There was scope for poultry, bee-keeping, piggery and mushroom cultivation enterprises mainly due to the proximity of Delhi market.

**Sharma L.R., J.P. Bhati and Ranveer Singh (1991),** observed the different farming system in the mountainous agriculture of the Himanchal Pradesh have emerged due to the specific agro climatic and techno economic conditions. These are (a) remittance based
traditional farming in low hills (b) Livestock based mixed farming in mid hills (c) Vegetable based farming in well endowed pockets of hills and (d) Fruit based farming system in high hills.

The study indicated that vegetable based and fruit based farming system are the harbinger of profitability and surplus in the agrarian economy. But there were certain limitations in their wider replication due to greater degree of risk and uncertainty as well as the implications for ecological imbalance.

In each zone there were heavy interdependence and strong linkages among different sub-systems of farming as well as with common property resource (CR). Forest and common grazing land. Hence, integrated planning for sustainable farming systems development is essential. However, the post-green revolution changes in Himachal Pradesh have led to non-sustainable use of land resources. They have generated more inquiry in the farming sector across zones and have increased the dependence on CPR and forest.

**Singh, A.K., L.R. Singh and J.S. Sharma (1991)**, has identified six farming systems namely (i) Crop farming, (ii) Crop + dairy farming, (iii) crop + goat farming (iv) crop + dairy + goat farming (v) Crop + goat + poultry farming and (vi) Crop + Piggery farming. Out of the identified farming systems, 10 percent of the total farmers with a minimum of 10 farmers in each of these farming systems were selected randomly. Thus the total marginal farmers finally selected were 83 from both the blocks. The data pertained to the Agril. Year 1983-84. Optimum farming systems for marginal farmers following different farming systems were
developed using linear programming models with the incorporation of cash borrowing activity, improved technology and unconstrained livestock units. Optimization of resource use indicates maximum potentialities as reflected through the percentage increase in income over the existing level in crop + piggery farming followed by that in crop + goat + poultry farming, crop + goat, crop + dairy + goat farming and crop + dairy farming. In crop farming, however the percentage increase in income was the lowest. The optimum combination of enterprises in a farming system is helpful in augmenting the levels of employment tremendously in all the optimal farming systems, excepting crop farming. There has been complete absorption of available family labour days on marginal farmers.

Singh S. N., K.P, Singh, L.R. Gupta, V.S. Kadian and N. Singh (1991), reported that in mixed farming systems more than 80 percent of the expenditure was incurred on animal component and income from this component was also around 80 percent. Labour, green fodder and concentrates were the major items of expenditure in animal components of mixed farming systems. It also generated the highest man day of employment, which varied between 612 in cross breed cows unit and 649 in buffaloes unit. Therefore the employment potential in agriculture increases with the inclusion of milch animals. On the basis of the different farming systems studied, it may be recommended that under canal irrigated condition of western Haryana Small Farmers, having a land holding of about one hect. can adopt mixed farming systems through out the year for earning better income and gain more
Can only be successful if better marketing facilities are available for the disposal of milk and other by-products of these systems.

Thakur D.S., K.D. Sharma and A.S. Saini (1991), observed that farming has been constantly improved and modernized first by evolving optimum cropping and mixed farming patterns. This was followed by new technology and improved cropping system that resulted in the green revolution. However as income from farming alone is not sufficient, farming systems approach which is holistic in nature is being followed increasingly in the post green revolution belt for achieving a quantum jump in farm production and incomes of farmers which can be replicated else-where. Under the farming systems approach, supplementary farm enterprises like fishery, apiculture, mushrooms, sericulture, poultry etc and off-farm work have been included in addition to the improved cropping and livestock systems. The optimum farming systems have been formulated and developed by using an integrated linear programming model.

The study reveals that under the optimum farming systems, production and incomes of the farmers increased nearly three times by intensification of farming. On an average, gross farm income which was only Rs. 47651 per farm in the existing farming systems increased to Rs. 135830 under the optimum farming systems. Similarly net income increased to Rs. 77430 from Rs. 26320. More over farmers needed to be ensured of better irrigation, new technology, farm inputs, credit, training, transport and marketing facilities, support
prices and timely procurement of their produce for achieving higher production and income.

Subba D.V. Rao (1993), has reported that sustainable land use over time improves ground water augmentation which increases income by 4.98% when the supply is raised from 5% to 9% every year in a semi arid region viz. Ranga Reddy district of Andhra Pradesh.

The land use pattern suggest that dry land horticulture, Sababul forestry plantation and pasture development should be taken up a large scale apart from inter cropping system. It is more conspicuous at low discount rate. Therefore low discount rate conditions need to be created to ensure sustainability. This can be done by extending the long term credit to sustainable farming systems. These conditions help to enhance employment potential. These systems further enable to provide sufficient feed and fodder to increase milk production, as the present livestock is under nourished. Hence the sustainable land use and livestock systems in an integrated way, have enormous potential to improve environment quality and food security in the years to come.

A-J Oskam (1996): in this paper, short and long-term perspectives of less intensive dairy farming are compared with other options. Three different farming systems are analysed in relation to sustainable production method. A number of relevant, hypotheses are tested, mainly at farm level, based on a wide range of information. Results clearly that low emission levels of minerals/ha because of less intensive land use are accompanied by lower levels of labour income.
Specialized intensive dairy farms are most capable of generating a sufficient income level. They can pay, either to attract more land or to remove surplus manure. The intensive dairy farms are in a strong position compared to dairy farm with a high degree of self-sufficiency. This implies that an integrated farming system in the dairy sector should be able to perform much better than the present intensive dairy farming in order to justify a sudden and important structural change in dairy farming systems.

A, Rangaswamy, et al. (1996), the economics of a rice-poultry-fish-mushroom farming system under lowland conditions in Tamil Nadu was studied during 1987-92. A net profit of Rs. 11755.00 year was obtained in a rice-poultry-fish mushroom integrated farming system (IFS) in 0.40 ha area. This compared with a Conventional Cropping system (CCS) with Rice-green-manure/pulses giving a net income of Rs. 6334/year from the same area. By inclusion of poultry-Fish-mushroom components in the IFS the net income per day increased to Rs 32.20 compared with Rs 17.35 in the CCS. Additional employment (174 man-days/0.40 ha per year) was also possible in IFS.

A-S Dawood et al. (1996), a model on integrated farming system to suit the small and marginal farmers under lowland conditions of Cauvery Delta Zone (Tamil Nadu, India) was studied to identify better methods for utilization existing resources in integrated crop/Live stock farming systems are evaluated. The integrated farming system generated a mean net income (Rupees/hectare) of Rs. 29004 as
compared to Rs. 19627 for the More Conventional system. The IFS increased income primarily by operating a recycling system. The employment opportunities in the IFS were also increased by 187 man day/year compared to the conventional system.

P, Santhi et al. (1996), field experiments were conducted from 1989 to 1992 at Bhavanisagar (Tamil Nadu India) with objective of studying the role of goats as a component in mixed farming on the economics of farming systems of small and marginal farmers in the lower Bhavani Project Area of Periyar district. The study was conducted on an area of one hectare. on 0.80 ha. a new pattern of cropping (All possible combinations of crops according to season) was followed. On 0.2 ha, grass was cultivated for feeding the animals. The economics of mixed farming was compared with conventional cropping. Net income from the crop component was Rs. 11436/year and the employment generated was 320 man-days, per-day income was Rs. 31.75, net income from the animal component was Rs 1381. The cost-benefit ratio was 1:1.28.

H, Abeygunawardena, D-H-A, Subasinghe, A-N-F, Perena and B-M-A-O Perena (1997), the farming system research (FSR) approach was used in this study to: (A) develop and refine a model for small holder intensively managed buffalo units (SIMBU), incorporating improved technologies and greater integration with crops and (B) demonstrate the feasibility, costs and benefits of such a system in over coming the emerging problems of rural land use patterns. The SIMBU was designed to be constructed with low-cost material and
managed with family labour. The feeding system was based on natural grasses, tree legumes and crop residues as the basal diet, with catalytic use of Urea-malasses-multinutrient mixtures (UMMM). The cost of supplementary feed/day declined the benefits. Regular income from milk to meet daily needs and overcome the agricultural debt cycle. The feasibility of intensified buffalo farming, the value of crop residues and Agro-industrial by-products as animal feeds and the use under utilized family labour for income generation in Sri Lanka.

DE: animal-production, body-weight, cost-benefit-analysis, diets,-farming-system, feed-intake, feed-requirement; milk-yield; mineral-supplements; molasses-technology-transfer; urea-orestry system were fully established, the tagasaste plantation was the most efficient at transforming natural resources into goods and services and the most profitable, while the lupin/wheat system was the least energy efficient and the least profitable.

DE: agroforestry-systems; alley-corpping; cropping systems; energy-consumption; energy-sourcres; farm-inputs; farming-systems; income-; labour -requirements; phosphate;- profitability-rotations ; solar-energy; wheat-; wind-erosion.

Dhindsa K. S. and Anju Sharma (1997), reported that the performance of pulses in the state of Punjab has been found to be dismal during the post green revolution period. The negative growth of production of pulses can be mainly attributed to a decline in area and stagnancy in the yield of various pulse crops. The supply response analysis of pulse crops revealed, that the non-price variables rather
than price variables were significant in determining the area response of various pulse crops (except moong) in the state and its various sub regions.

The area under summer moong as well as main season moong has increased very fast in south western region and control region of Punjab.

Season wise summer moong does not directly compete with maize crop, yet it does so because ideally the summer moong should be grown in march when the wheat crop is still in the field. Similarly in the main season moong can also be inter cropped profitably with maize, groundnut and cotton crops. Poor yield performance and low value productivity per hectare of moong do not indicate, its scope for regaining its area from its competing crops. Some area under moong could however be increased by intercropping it with bajra and maize in Kharif season. Due to shifting of better quality land from gram to other crops like wheat and rape seed, mustard, the average yield and value productivity per hectare of gram have declined significantly in various regions of the state. Hence the scope for increasing the area under gram appears to be very limited in the state. In order to increase the area under gram, there is a need to develop improved varieties and which have resistance to blight and other diseases as well as pod borer, with the increase in irrigation facilities, the farmers have shifted the area from un-irrigated crop to more profitable crops like wheat and rice which require assured irrigation facilities. Thus to encourage the farms to grow more of pulse crops, such high yielding varieties of seeds
should be evolved which can give higher yields on irrigated land and can be remuneratively grown in those soils where the yields of cereals are relatively low.

Goswami Sailendra narayan (1997), observed that shifting cultivation (Jhuming) in combination with terrace cultivation and horticulture plantation in hill slopes settled agriculture. In valley land between two hill slopes and livestock rearing are the predominant farming systems practiced by the tribal farmers of west Garo hills district. The farms in the study area consisted of valley land cultivation shifting cultivation along with terrace cultivation and horticultural plantation in hill slopes, and livestock rearing. Most of the inter villages of west Garo Hills district are covered by this type of farming systems. In jhum, mixed crop (Jhummixture) consisting of cereals, vegetables and root crops are grown. Sometimes jhum rice along is taken up in the second years of jhum cycle.

HYV and local rice cotton, maize, ginger, tapioca, sweet potato etc. were grown in the terrace that were made in the hill slopes (Jhum land) Pine apple and banana are the major horticulture crops grown in the jhum land.

S. N. Singh et al. (1997), the results of a seven year study (1984/85-1990/91) on various farming system units of one hectare irrigated land in Haryana revealed that a mixed farming system with three crossbred cows was non remunerative compared to a mixed farming system with three buffaloes. More than 80% income was obtained from animal components. Labour employment generation
was more in mixed farming with three buffaloes. The salient feature of the study was that the income and employment generation was consistent throughout the period of seven years.

V, Phengvichith’ (1998), livestock have a vital role in sustaining the upland farming system and improving the living standards of farmers. Crop production without livestock would be almost impossible in the uplands of Laos. Livestock are kept in the household with multiple objectives. Rearing livestock is the second largest agricultural activity in uplands, Since it is the primary source of cash income. Moreover, livestock play a significant role in the Laos economy as a whole. To test the hypotheses that such a mixed farming system might improve sustainability of agriculture in flevoland, nutrient balances, labour requirements and labour income were quantified for a specialized arable farm, a specialized dairy farm and both combined into a mixed farming system, exchanging land, labour and machinery. Scope for reduced biocide use in the mixed farming system was assessed in a qualitative way. In the mixed farming system labour income per hect. was 25% higher. Some 70% of this increase could be explained through higher yields per hect. of the profitable crops were potato (Solanum tuberosum L.) and sugarbeet (Beta vulgaris L.). The remaining 30% resulted from lower costs, mainly through a better utilization of available labour.

Differences between the combined nutrient balance of both specialized farms and that of the mixed farming system were small. Indications of reduced biocide use in the mixed farming system could not be found. It was concluded that in a mixed farming system it is
possible to realize a higher income without increasing environmental pollution. The key factor is the ratio between animal and arable production determining the extent of which crop rotations can be widened and the relative amounts of slurry that can be applied to grassland.

Bos, J-F-F-P, and G-W-J-van-de Ven. (1999), mixed farming system have potential agronomic, environmental and socio-economic advantages over specialized farming systems. This paper attempts to quantify. Results of a survey, conducted in 1993-94 on the role of home gardens in the livelihood systems in the Zaka and Gutus communal areas of masvingo province in southern Zimbabwe. The management strategies and related crop husbandry practices in the home gardens are discussed. Individual gardens and community gardens are compared in terms of management and crop diversity in order to identify a potential strategy for development support. It is suggested that home gardening plays an important role within the overall farming system. The fact that nearly every household has a home garden shows that gardening is considered important by farmers and influences labour, household food security and income generation. Individual gardens also contribute to bio diversity conservation in rural areas.

DE: bio diversity--; common lands; crop-husbandry; crop-production; domestic-gardens; food-security; land-management; soil-fertility; surveys sustainability.
Rajendran, K and A-C, Lourduraj (1999), different combinations of crop-based enterprises, for example including fish or livestock enhance income of rice-based systems and provide better utilization of family labour. A systems including poultry and fish is used in the lowland rice growing areas of the Cauvery delta and western zone wetland of Tamilnadu. Integrated farming system, comprising pigs, ducks, goats, fish and azolla are predominant in the rice growing areas of the Philippines. Addition of azolla to rice-fish systems provides feed for fish and nutrients to rice up to 30% increase in grain yield of rice has been reported due to rice-fish culture.

Roy B.C. and K.K. Dutta (2000), reported that rice wheat crop sequence has emerged in a big way in the state of Haryana during the last two decades. The area under rice and wheat in the state is 0.83 and 1.97 million hectares (mha) respectively and as a system rice-wheat and corers more than 0.6 mha which account for 16.73% of the total cropped area. Most of the area under rice-wheat rotation is concentrated in the belt known as indo gangetic. rice-wheat economy of this region is of great importance due to many reasons. Apart from its significant contribution, towards national food security and from employment, this system is crucial for farm export (mainly basmati rice). Also a large number of non farm families depend directly and indirectly on the rice-wheat output in the region is an important determinant of growth of agricultural sector in the state.

In this study, the central idea of a yield gap is crucial to understand the security of difference constraints that need urgent
research attention. Yield gap is defined as the difference between the potential yield and actual yield gap, 1st is the difference between an experiment stations average yield and an on farm experiment average yield. This yield gap arise from differences in environment that can not be managed in the farmers field. Yield gap ii, which is the primary concern of the present study, is the difference between the actual farm yield and the yield attained in on farm experiment. This gap reflects the effects of various biotic, a-biotic and socio economic constraints.

The average yield obtained by the farmer's is less than half of experiments station yield. In all the crops yield gap ii is very large compared to yield gap i. This suggest that these are barriers to improved management practices which can be managed in the farmers fields.

Alhamidi, S-K, et al. (2003), the traditional farming system (TFS) in the ghouta has been an integral part of the social life and has contributed to the food supply of demascus, syria, for millennia. This study is an attempt to analyse the economic performance of this system. The objective is to evaluated the economic performance of the TFS and its impact on system viability. Three farms, representing the three different agricultural strategies in this area, were selected for data collection. Participant observation was used to derive estimates of labour, costs and revenues, which are not recorded by farmers. These three farms formed a base for continuous contact with other farmers in the Ghouta. The average values, after cross checking with
these estimates and other farmers, were used in the economic analysis at three levels (Production, Family and Market Level). The production system of the Ghouta is adaptable to economic forces of a major city as the high level of market orientation of the TFS stimulates diversity of farms. It is concluded that the diversified farms managed by farmers in this area provide a satisfactory income, which is in-accordance with their texture, the tropical ferruginous soil appear the most delicate. Its fertility is linked with the age of the plot, the soil with more clay such as the "Planosol" rather show imbalances in basic matter not related to the crop age. The best productivity per hectare was observed with groundnut, followed by cotton and finally cereals, while their labour productivity was exactly in the reverse order. The valuation of the labour day by agriculture varied according to the crop and the villages between 500 and 2000 FCFA, which make the agricultural sector to be less lucrative. The improvement of the weed control is the research and development way susceptible to a rapid increase in rural populations income, to keep the soil fertility is a necessity for the consolidation of those incomes in the long term.

Guibert, H, et al. (2003), some surveys were realized within the context of PRASAC in 1999 on 84 plots of cotton in four sleeted villages of north cameroon and in 2000 on three Principle speculations of 48 exploitations to organize into hierarchy the main constraints in farming system. Each category of variable (soil climate and cropping techniques) has approximately the same weight in the explanation of the yield variability. The main constraints in the crop production such
as cotton, groundnut, maize and sorghum are the weeds despite the fact farmers expense in time and intranets the majority of their resources to control them. The soil fertility appear to follow some contrasted evolutions in tically integrated contract farming system can be a means to develop markets and to bring about the transfer of technical skill in a way that is profitable for both farmers and integrators. This study was based on primary data collected from 50 sample farms of ABFL, the pioneer vertically integrated poultry contract firm in Bangladesh. It was revealed in the study that contract farmers get several incentives from the vertically integrated firm, which include credit, production and price risk reduction, marketing assistance, technical know-how etc. The study also found that contract farmer were better of in terms of net income by getting a high net return from the poultry farm.

Rathore, J. S. (2004), this study considers, the following house hold- Level coping strategies against drought in three villages of Rajasthan: (1) Live stock-based farming system, (2) Crop-mix and cropping pattern, (3) Tree management and agro-forestry, and (4) Migration. The three villages were selected from three different agro-climatic regions: One village from Jaipur district that lies in the semi-arid region, one village from the humid rainfed Rajsamand, and one village from Nagpur district of the arid region. The basic question is: how do villagers in slightly different agro-climatic region cope with drought? It was observed in the sample villages that most of the small and marginal size-classes of household largely seek employment in
the urban labor market. Also the diversification of occupation is one of their strategy to cope with drought, thus the study stresses the importance of the non-farm sector in generating income and employment.

**Shah Hassnain et al. (2005),** rainfed areas make a significant contribution to agriculture and livestock production of Pakistan. Out of the total cropped area of 20 million hectares about 5 million hectares do not have any irrigation facility and completely depend on rain. In Punjab, Barani area contribute about 20% of cropped area. Livestock is an important part of the farming system. Feed resources, however, are scare and livestock has to survive on crop residues. Aand on degraded range areas due to the low and unreliable rainfall in the region, yields of the main crops are low and farm income mostly remains in-sufficient to maintain the family. Since prospects for increasing cultivated area are limited due to irrigation water constraints, the strategy for sustainable food security and livelihood calls for significant increases in crop and livestock productivity through sustaintial enhancement of output per unit of land, animal and labour. The present study was conducted at three sites selected for participatory research under the Barani village development project. Detailed characterization of the sites was done through a participatory rural appraisal followed by a detailed survey of 150 households. On going assessment of technologies recorded significant improvement in fodder crops. The adoption of urea mineral Molasses blocks ensures improved milk productivity and animal health along with feed security.