Review of Literature:

Awate S. et al [1] stated that as the largest private enterprise in India, agriculture contributes one-forth of the national GDP. Agriculture has been and will continue to be the life line of Indian economy. However, agriculture productivity and development differ very much from region to region, which needs a detail investigation. The temperature and pedagogical conditions are favorable for growing valuable crops like jawar, sugarcane, oil seeds, bajara, wheat, etc. By contrast, very low level of agriculture productivity is confined to the tahsils belonging to drought prone areas having irregular rainfall, rugged topography and poor irrigation facilities. Inadequacy of water is main hurdle in agriculture productivity. For the present investigation tahsilwise secondary data has been collected from socio-economic review and District Statistical Abstract.

Rajhans S.et al [2] discuss that India is the most extensively irrigated country in the world. The problem of Indian agriculture is mainly the water supply. Water is indispensable to agricultural production. In areas where rainfall is well distributed throughout the year, there is no problem. But in uncertain rainfall areas irrigation is quite essential for cultivation. For the sugarcane cultivation there is requirement of regular supply of water. Because of this Krishna Sugar Factory established a Krishna Irrigation Scheme in 1967.

Todkari G.U. et al. [3] analyzed the agricultural land use pattern at micro level in Solapur District. This study is based on secondary data collected from secondary records. Agriculture production is influenced by physical, climatological, socio-economic, technological and organization factors. An Endeavour is made here to study crop combination regions in Solapur District for year 2004-2005. This is normal year for agriculture phenomenon in this district. The crop data has been computed with the help of Weaver’s technique of crop combination. Solapur district occupies southern part of Maharashtra state. It occupies an area of 14,84,559 sq.km. And supports 32.32 lack of population in 2001 censes. Administrative the district is divided in to eleven tahsils. Physiographic, temperature, rainfall, soil and drainage influence on Agriculture land use pattern in this district. Temperature is high in summer. Because of
district is located in drought prone area of Maharashtra. Rainfall varies between 200 to 600 millimeters rainfall from west to east in entire district. Thirteen crops have been considered for crop ranking and crop combination. Among these jawar, wheat, bajara, sugarcane, gram, maize, safflower, cotton, etc. are the major crops. By computing crop ranks and crop combination, Solapur District has ten crops combination. Such type of study represents real situation of cropping pattern in Solapur District and helps to planners, agricultural scientists and research scholars.

Dayal et al\cite{4} reported that India is the most extensively irrigated country in the world. The problem of Indian agriculture is mainly the water supply. Water is indispensable to agricultural production. In areas where rainfall is well distributed throughout the year, there is no problem. But in uncertain rainfall areas irrigation is quite essential for cultivation. In the study region Krishna and Koyana are important rivers. The river valleys are occupied by typical black soil. Basalt is the main stone in this region. The geological formation of this region is only the Deccan trap. Agriculture is the most important occupation of people in this region. The annual temperature of this region is minimum 210\degree C and maximum 310\degree C. The annual average rainfall is 650 to 750 mm.

Hussain et al \cite{5} reported that to analyze the agricultural land use pattern at micro level in Solapur District. This study is based on secondary data collected from secondary records. Agriculture production is influenced by physical, climatological, socio-economic, technological and organization factors. An Endeavour is made here to study crop combination regions in Solapur District for year 2004-2005. This is normal year for agriculture phenomenon in this district. The crop data has been computed with the help of Weaver’s technique of crop combination.

Jean-Philippe Venot \cite{6} reported that closed river basin is a basin where most or all available water is committed and river discharge falls short of meeting environmental functions (flushing out sediments, diluting polluted water, controlling salinity intrusion, sustaining estuarine and coastal ecosystems).
Molle et al.\cite{molle2007} explain the process of basin closure intensifies the interconnectedness of ecosystems and water users across the basin for sugarcane. When river basins close, supply development projects and demand management reforms eventually tend to result in a regional or sectoral redistribution of water for sugarcane, along existing economic, political and social forces. Early warnings of such an evolution are emerging in the Krishna basin. During 2001–2004, surface water resources were almost entirely committed to human consumptive uses, groundwater was over abstracted and the discharge to the ocean was almost nil. The absence of any basin-wide strategy for water management has led to an uncoordinated expansion of surface water infrastructure and groundwater abstraction. As the Krishna basin closes, recurring water conflicts suggest that there is not enough water for sugarcane and the environment: while more water is diverted than ever before, the security of supply to all existing users naturally declines fuelling a feeling of scarcity and leading inevitably to conflicts over access and allocation.

K. Krishna Kumar\cite{kumar2009} discuss agriculture (arguably the backbone of India’s economy) is highly dependent on the spatial and temporal distribution of monsoon rainfall. This work presents an analysis of crop–climate relationships for India, using historic production statistics for major crops (rice, wheat, sorghum, roundnut and sugarcane) and for aggregate food grain, cereal, pulses and oilseed production. Correlation analysis provides an indication of the influence of monsoon rainfall and some of its potential predictors (Pacific and Indian Ocean sea-surface temperatures, Darwin sea-level pressure) on crop production like sugarcane. All-India annual total production (except sorghum and sugarcane), and production in the monsoon (except sorghum) and post-monsoon seasons (except rice and sorghum) were significantly correlated to all-India summer monsoon rainfall. Monsoon season crops (except sorghum) were strongly associated with the three potential monsoon predictors. Results using state level crop production statistics and subdivisional monsoon rainfall were generally consistent with the all-India results, but demonstrated some surprising spatial variations. Whereas the impact of subdivisional monsoon rainfall is strong in most of the country, the
influence of concurrent predictors related to El Niño southern oscillation and the Indian Ocean sea-surface temperatures at a long lead time seem greatest in the western to central peninsula.

Bidyut Kumar Ghosh\textsuperscript{[9]} examine the cropping pattern of India over the period of 1970-71 to 2006-07. This has been an eventful period in the history of agriculture in the country. While the decades of 1960s and 1970s were marked by successful story of Green Revolution in few selected area of the economy followed by a significant change in the 1980s, only during the decade of 1980s the Green Assistant Professor, Dr. P.C. Mhalanabish School of Management, Supreme Knowledge Foundation Group of Institutions, Mankundu, Hooghly, West Bengal, India. Revolution was successfully implemented throughout the country including the highly densely populated eastern Indian states. The agriculture of the country faces the fears of globalisation as India adopted the policy of globalisation during the early 1990s.

L. Surinaidu\textsuperscript{[10]} studied the basaltic aquifers of the Upper Bhima River Basin in Southern India which are heavily utilized for small-scale agriculture but face increasing demand-related pressures along with uncertainty associated with climate change impacts. To evaluate likely groundwater resource impacts over the coming decades, a regional groundwater flow model for the basin was developed. Model predictions of different climate change and abstraction scenarios indicate continuation of current rates of abstraction would lead to significant groundwater overdraft, with groundwater elevations predicted to fall by $-6m$ over the next three decades. Groundwater elevations can however be stabilized, but would require 20–30\% of the mean surface water discharge from the basin to be recharged to groundwater, along with reductions in pumping (5–10 \%) brought about by improved water efficiency practices and/or shifts towards lower-water use crops. Modest reductions in pumping alone cannot stabilize groundwater levels; targeted conjunctive use and improved water use efficiency are also needed.

Barakade A.J\textsuperscript{[11]} reported that in India, sugarcane is an important commercial crop. The sugarcane plant is a tropical plant and has been known in
India from earliest times. Its reference is found in Atharva Vedda, before 3000 to 7000 years ago. India is the fourth major sugar producing country in the world, the first being Russia, Brazil and Cuba. Indian sugar industry has lion’s share in accelerating industrialization process and bringing socio-economic changes in under developed rural areas. About 4.5 are engaged in sugarcane cultivation in India. Sugar factory (Co-operative, private and public) has been instrumental in initiating a number of entrepreneurial activities in rural India. In Maharashtra 10, 39,000 hectares area under sugarcane cultivation especially in western Maharashtra and 91 lakh million tonnes sugar production (2010-11). In Satara district 70,538 hectares area under sugarcane cultivation and 10 sugar factories are run (2010-11). The first sugar factory was established in 1957-58 namely Shriram Sahakari Sakhar Karkhana Ltd. Phaltan. Today 10 sugar factories crushed in Satara district. The increase in sugar cultivated area and growth of sugar industry has manifold effects on socio-economic conditions in the district. This attempt has been made to 2000-01 to 2009-10 area under sugarcane cultivation in Satara district.

J Stephen Arul\textsuperscript{[12]} conclude that many varieties are available for sugarcane cultivation under conventional method, since the varieties are bred for conventional planting under 80 cm spacing, it is better to select high and continuous tillering varieties for growing cane under wider row with drip irrigation. Some of the choicest varieties that can be used under drip irrigation are CoA92081, Co86032, CoA90081 and CoV92102. Drip irrigation and wider row of cane planting together. This practice is the ultimate way for mechanisation, be it in a modest way or on a full scale. It is high time, the farmers get used to this technology.

U S Natarajan\textsuperscript{[13]} has studied that tillering is a major contributing factor for higher productivity under SSI. Tillering potential under SSI is very high because of transplanting seedlings, wide row spacing and application of moisture to the level needed. Tillering under conventional system is very low, the millable canes resulting more from very high seed rate rather than from the inherent tillering potential of the buds planted. Since germination phase is very short in SSI, there is
synchronous tillering resulting in better recovery. The bottom most six internodes in sugarcane are engineered to produce tillers and the internodes above do not produce tillers unless there is damage to the shoot apex. With only two cycles of tillering from the mother shoots, the number of tillers could easily go beyond 20 per clump if ideal conditions are provided. Tillering could be better if younger seedlings with 20 days of age are planted. There are chances of genetic differences for tillering getting narrowed down under SSI.

K Sivaraman\textsuperscript{14} investigated that the context of diminishing labor availability and increasing cost of labor is always advisable to go in for wider row spacing around 150 cm to facilitate mechanization in farm operations mainly harvesting of canes. Light energy differs from other resources in that it could not be regarded as a reservoir from which demands could be made as required. It is instantaneously available and to use it for photosynthesis, it has to be intercepted instantaneously. For continued interception and fixation of solar energy, optimum leaf area is essential throughout. This cannot be achieved in monocropping of sugarcane with the adoption of wider row spacing. Again to maintain ecological balance, it would be ideal to intensify cropping with sugarcane both in time and space. Especially under wider row spacing, with adequate availability of soil moisture, nutrients and light during initial crop growth stage, it is advantageous to raise suitable short duration intercrops. This helps the farmer not only to get additional income from the land but also reduces cost of cultivation in managing weeds in the interrow spaces of sugarcane.

B. J. Pandian\textsuperscript{15} reported that sugarcane, one of the most important commercial crops is being grown in an area of around 3.06 lakhs hectare in Tamil Nadu with a productivity of 106 Mt ha\textsuperscript{-1}. Farmers cultivating sugarcane are facing multiple problems. Water is one of the major constraints and it is affecting the productivity and profitability of sugarcane growers and millers. The problem is going to further deteriorate due to variability of rainfall influenced by climate change. So, unless sugarcane farmers are provided with options of high yields with much less water, they will find it difficult to meet its growing demand for sugar.
M Vijay Kumar et al [16] conducted field experiment at Agricultural Research Station, Basanthpur-Mamidigi to study the growth behavior, yield and quality of bud chip in comparison with traditional system by using eight different varieties of sugarcane during 2009-10 and 2010-11. The results revealed that propagation bud chip method had recorded higher cane yield (148.56 t/ha) compared to traditional method (139.3 t/ha). The stool weight (22.37 kg), leaf area index (6.82 cm²), cane height (340 cm), cane girth (3.36 cm) and single cane wt (2.36 kg) were higher in the bud chip method compared to traditional method.

V.K. Singh et al [17] reported that the prime concern of cane growers and the sugar industry is to achieve higher sugarcane productivity and high sugar recovery both of which support maximum economic return. In India, widely varying soil fertility domains is a major limitation to reaching this goal. The results of on-farm experiments conducted during 2003-04 and 2004-05 have clearly established that productivity can be significantly improved when balancing N and P use with K, S, and Mg.

Bharadwaj O.P. [18] studied that the data collected has been processed and method of yield co-efficient has been employed to find out the levels of agriculture productivity. The result are shown in tabular and from and are also depicted by choropleth method on map. The attempt has been made to assess the regional disparities in levels of agriculture productivity in Solapur District of Maharashtra.

Sharma, S. K. [19] has studied the role of Irrigation Scheme in agricultural development. Basically the entire study is based on secondary data. The Krishna Irrigation Scheme is developed in the Karad, Walwa.

Ghodake S. K. [20] reported that sugarcane cultivation needs regular supply of water. Because of this Krishna Sugar Factory established a Krishna Irrigation Scheme in 1967. The objective of this paper is to study the role of Irrigation Scheme in agricultural development. Basically the entire study is based on secondary data. The Krishna Irrigation Scheme is developed in the Karad, Walwa. The study area is located in Karad tehsil of Satara district (Maharashtra). Y. M. Krishna Cooperative Sugar Factory is the one of the famous sugar factory of
western Maharashtra. This factory lies between 17010\textdegree\ north latitude and 74014\textdegree\ east longitude. The altitude of the area is 574 mts. above mean sea level. The catchments area of Krishna Sugar Factory is in Karad, Walwa and Khanapur tehsil.

Magare et al\cite{21} reported that Solapur district occupies southern part of Maharashtra state. It occupies an area of 14,84,559 sq km and supports 32.32 lack of population in 2001 census. Administrative the district is divided in to eleven tahsils. Physiography, temperature, rainfall, soil and drainage influence on agriculture land use pattern in this district. Temperature is high in summer. Because of district is located in drought prone area of Maharashtra. Rainfall varies between 200 to 600 millimeters rainfall from west to east in entire district. Thirteen crops have been considered for crop ranking and crop combination. Among these, jawar, wheat, bajara, sugarcane, gram, maize, safflower, cotton, etc. are the major crops. By computing crop ranks and crop combination in Solapur District has identified ten crop combination. Such type of study represents real situation of cropping pattern in Solapur Dictors. strict and helps to planners, agricultural scientists and research scholars.

Tupe b K\cite{22} investigated that the agricultural production is influenced by physical, socio-economic, technogical and organizational factors. Endover is made to study crop combination region in rahata tahsil of Ahmednagar district, Maharashtra. Physiography, rainfall, soil, temperature and drainage influences on agricultural land use pattern in this tahsil.

Patil P V et al\cite{23} reported that agriculture has always occupied an important place in Indian economy. The proportional of cultivable land per man has been decreased to a considerable extent during the recent past. The increase in crop production is a must in India since the areal spread of crop land has almost reach to its saturation limit.

Seema Sepat\cite{24} reported that IFS reflects sustainable agriculture on holistics in resulting in improved farm income, maintenance of eco balance and stability, food and nutritional security and overall improvement in the quality of life of sugarcane farming.
Avinash Kadam\cite{25} describes attempts to evaluate sugarcane resources in Baramati tehsil (MS). The parameters like population, geographical area, food crops and sugarcane cultivation have been selected to compute densities and distribution of sugarcane.

Sharma S.C. \cite{26} reported that Maharashtra has achieved the position of being the premier sugar producing state in India. Sugarcane cultivation is confined to river valleys of Krishna & Godavari. Sugarcane, being a cash crop, has a place of pride in the economy. Sugar industry is the second leading industry next to cotton textile, contributing a substantial share in the uplift of rural economy.

Shinde S.D. \cite{27}, explain the length of growing season of sugarcane is limited by the climatic conditions. The growing season of sugarcane ranges from 12-18 months in the region under study. The cane starts growing in December to February & harvesting starts in Oct. & continuous up to the middle of April. The planted or seasonal canecrop is harvested after 12-13 months whereas Adsali is harvested after 17-18 months.

Hapse D.G. \cite{28} reported sugarcane is grown in different types of soils, it is mostly confined to the alluvial tracts of the river flood plains it thrives well in dip, rich clay, soil. Medium black to deep black soil in the river valley of upper Krishna basin are also used for growing sugarcane. Because of high fertility & availability of irrigation facility, the alluvial tracks in the study area constitute the core area of sugarcane cultivation.

K.V. Joshi \cite{29} have been suggested that Sugarcane soil of upper Krishna basin is useful for agriculture development in Kolhapur area. The soil of Kolhapur area is erosion form from running water is more in hilly & heavy rainfall area of west. This area is affected by thousand of tones of soil are washed away by running water. Therefore proper irrigation methods are adopted to prevent fine soil.

Parthasarthy S.V. \cite{30} investigated that there are about 18 elements essential for sugarcane growth. The presence of N, K & P in soil contributes towards higher crops. Nitrogen is absorbed in soil from atmospheric air.
Phosphorous is plays an important role in rute production of sugarcane & affected the development of sugar. Potassium increases sugar contents in Sugarcane