1. INTRODUCTION

“Sugar factories in India are an important source of employment and income for labour in rural areas”

-Kandaswamy, 1990

About 195 countries grow sugar crop to produce 1,324.6 million tons (more than six times the amount of sugar beet produced). As of the year 2005, the world's largest producer of sugarcane by far is Brazil followed by India. Uses of sugarcane include the production of sugar, Falernum, molasses, rum, soda, cachaça (the national spirit of Brazil) and ethanol for fuel. The bagasse that remains after sugarcane crushing may be burned to provide both heat - used in the mill - and electricity, typically sold to the consumer electricity grid.

It may also, because of its high cellulose content, be used as raw material for paper, cardboard, and eating utensils branded as "environmentally friendly" as it is made from a by-product of sugar production. In India, the states of Uttar Pradesh (38.57 %), Maharashtra (17.76 %) and Karnataka (12.20 %) lead the nation in sugarcane production.

Sugarcane is an important cash crop occupying second largest agro-industry next to textile in the country. This is because; it is labour intensive
crop and provides livelihood to millions through an organized industry that it carries with it in the rural India. As many as 35 million farmers in this country grow sugarcane and rely on it for their livelihoods. Another 50 million depend on employment generated by the 571 sugar factories and other related industries using sugar. In Uttar Pradesh, Maharashtra, and Tamil Nadu, sugarcane plays a major role in the state economy. The working force employed directly by the sugar factories along with sizeable number of technical staff and highly trained engineers and chemists is estimated about 0.5 million persons. Thus, sugarcane is an important cash crop, which affects the livelihood of human being in India.

Sugarcane is, although, an annual crop in nature, yet several crops possessing the characters of short duration and dwarf in nature can be taken up as intercrops successfully in between the sugarcane rows without significant reduction of cane yield. These intercropping systems with sugarcane provide food, feed, fuel/fat and fund to the growers even on limited land resources.

Indian sugar industry, second largest after the textiles industry, has been playing a vital role in the socio-economic transformation of the country. To sustain such a huge agro-industry, a wide research infrastructure has been created in the country. At present, the country has three national institutes, 53 state research centre's and four sugar factory sponsored research stations. At the national level, all research activities are coordinated by an All India Coordinated Research Project which operates under the
control of Indian Council of Agricultural Research (ICAR). The initiation of this infrastructure started as early as 1886 with the establishment of a small Agricultural Research Station at Manjari near Poona in Maharashtra (Yadav, 1990). At present, every cane growing state has its own research institute with regional centres in each ecological zone.

Now a days the sugar industry is dwindling and lamenting over its poor profitability. The reason being that the required quantity of sugarcane for a sugar factory is brought out from the large areas due to low productivity level (State average yield in U.P. is 55.5 t/ha and the national level is 59.1 t/ha - 2003-04). Thus, it is urgently needed to increase the productivity of sugarcane for required level of supply to the factory on one hand and prove it worth when compared with prevailing crops in the area on other hand. Thus, the technology should be developed on the basis of various categories of farming population operating under highly divergent resource endowments and agro-ecological characteristics.

1.1 STATEMENT OF PROBLEM

Sugarcane is one of the most important industry based crops in the world. India is the second largest sugarcane producer and the highest sugar consumer in the world. Apart from sugar, sugarcane is grown for many other uses like fodder, paper and bio-fuel. In spite of its growing demand, there are a number of problems which affect the sugarcane farmers in sustaining their production and increasing their profit. On the ecological
front also sugarcane cultivation is becoming a difficult task, due to its water-guzzling nature and depleting water table. So, it’s high time we amend our usual, high inputs intensive method of sugarcane cultivation and lookout for some innovative, resource concerned method of producing sugarcanes.

Inspite of vast research net work in the country, sugarcane productivity in India is only 59.1 t/ha (2003-04), much lower than the yield obtained at research stations (184 t/ha). Singh (1978), on the basis of theoretical calculation, reported that the production potential of sugarcane in terms of strip cane stalk is 474.24 t/ha. The cane yield of 464.03 t/ha have also been attained in All India Cane Competition Plots (1973-74) in Maharastra for eighteen months adhsali crop. The trend of potential and production is by and large similar in sub-tropical India where the highest yield obtained in Uttar Pradesh, the main domain of sugarcane and sugar production in India, is 335.42 t/ha (twelve month crop) in the competition plots (1969-70) as against the state average yield about 44.0 t/ha.

During the last 10 years, sugarcane production in India has fluctuated between 233 million tonnes and 355 million tonnes per year. Similarly, the productivity at the farm level is as low as 40 tonnes/ha. With such low yields and fluctuations in production, and predicted increases in the variability of rainfall due to climate change, the industry is in for big trouble.

One of the world's thirstiest crops, approximately 25,000 kg of water is needed to produce 100 kg of sugarcane. Unless sugarcane farmers are
introduced to new methods for producing higher yields using much less water, the country will find it difficult to meet the growing demand for sugar.

Uttar Pradesh being a leading state for growing sugarcane occupies the area of 2.03 million hectares with the production of 112.75 million tonnes annually. Thus, the average yield of sugarcane is 55.50 t/ha as against 59.10 t/ha at the national level and 335.42 t/ha at the competition plots in sub-tropical India. This shows a wide gap between potential and production of sugarcane in the country. It was reported that farmers adopt only 30-35 percent of sugarcane production technologies and its bulk remain utilized (Verma et al.1986 and Mishra, 1989).

1.2 IMPORTANCE AND JUSTIFICATION

Sugar has been considered to be one of the unavoidable necessities of life and it is demanded by the people belonging to all the classes of the society. The consumption of sugar in the country during past few years has been rising at a faster rate than the indigenous production and, therefore, it would sometimes become necessary for us to resort to imports of sugar. Fortunately, India being a predominantly agricultural country with a favourable agro-climatic condition for sugarcane cultivation may not only fulfill the need of countryman, rather it may export more sugar to other parts of the world when our farmers are trained with skilful utilization of
technology. Sugarcane is a food crop, but now it has chosen for bio-fuel to cut down on oil imports and ease the burden of rising fuel costs.

Sugar in India is mainly produced only from sugarcane, as the hot tropical climate of the country is suitable for cane cultivation. Over the past sixty-five years, the yield of sugarcane in tons per hectare has more than doubled. Sugarcane is also grown in Punjab and Uttarakhand though the weather here is quite cold. Sugarcane provides an alternative to widely adopted wheat-paddy cropping system. Development of improved varieties and new crop production, plant protection and processing technologies has resulted in the expansion of the sugar industry in the area.

The Sugarcane Breeding Institute has come up with a list of different varieties of sugarcane suitable for commercial cultivation in different States. In Uttar Pradesh, the recommended varieties for early ripening are CO-687, COS-8436, COS-88230 and COJ-64 while sugarcane varieties for mid season and late ripening are COS-767, COS-8432, COS-1148, CO Pant-84211 and BO-91 etc.

The productivity of small-scale sugarcane contractors affects not only their own profitability and sustainability, but that of other stakeholders as well, such as the small-scale sugarcane farmers they contract to and the sugar mills they supply with sugarcane. The application of science and technology for increasing the productivity per unit of time, land and animal can never be overstressed. Realizing the significance of science and
technology, a number of research institutes and universities have been established by the Government of India, not only to generate manpower but also to develop technologies, which if applied by the farmers, would lead to increased production. Speedy development in crops is vital to the progress of our country. A large populace of farmers in the country is not able to exploit the potentiality of their crops because of poor utilization of available technologies but the mechanism for transferring it to the illiterate and small users in an effective manner does not exist ironically, there is a global communication network, which makes the latest findings of science available almost immediately to research workers in any corner of the world, but what is urgently needed is such a communication net-work meant for the poor farmers in our country (Chauhan, 2004).

The main problem, as it exists today, is the low rate of dissemination of available technologies related to sugarcane cultivation. Decision of the farmers to adopt the technologies depends on the number of the factors such as social, economical, cultural, situational, etc. As such, it is realized that in order to introduce new techniques successfully, it is necessary that the person engaged in development programme should himself or herself be considered as motivator and become an active disseminator of the technologies.

In this context, it is of great significance to know the various sugarcane cultivation practices as being practiced by the farmers of
Bulandshahr district. The result of the study would be providing an immense help to the research scholar, official of the sugar industries, planners, administrators, extension personnel, NGO and persons engaged in sugarcane development, to prepare future plans and effective extension strategies.

Keeping in view the above situation, a study entitled Adoption gaps and constraints analysis of sugarcane cultivation in Bulandshahr district of Uttar Pradesh has been planned with following objectives:

1. To know the existing level of technical knowledge and adoption pattern of farmers in varying aspects of sugarcane cultivation.

2. To find-out the gaps in knowledge and adoption of farmers in sugarcane cultivation.

3. To establish correlation between knowledge and adoption pattern of sugarcane growers.

4. To find-out the constraints faced by farmers for adoption of sugarcane cultivation.

5. To develop a suitable extension strategy for increasing yield potential of sugarcane in project area.
1.3 LIMITATIONS

1. The study has obvious limitation of the area, time and other resources as faced by the single researcher.

2. The present study was confined to only gap in knowledge and adoption and constraints in sugarcane cultivation practices.

3. The study was based on expressed response of respondents which might not be completely free from individual bias.

4. There were 15 selected characteristics included in the present investigation and i think some more independent variable should be studied, so that existing gap could be minimized in sugarcane crop.

5. The study will not claim to generalize the findings on large scale, as it was confined only to four sugar mills operating areas and three selected villages from each sugar mills operating area of Bulandshahr District.

1.4 ORGANIZATION OF THE THESIS

In all there are five chapters constitute this thesis. Introduction is the first chapter that covers the essential background information, statement of the problems, objectives, importance, and limitations of the research work.
The second chapter is **review of literature**, where related references pertaining to the study has been reviewed and **research methodology** is discussed in the chapter three which is covering the study area sampling plan, a brief description of the study area, variables and their measurement, data collection and statistical tools used to analyze the data, whereas **results and discussions** are presented in chapter four.

The fifth chapter outlines the **summary and conclusions** deduced from the results of the study. **bibliography and annexure** are presented in the last parts of the thesis.