CHAPTER I
INTRODUCTION

Cotton is one of the most important commercial fibre crops of India. Today, it continues to rule as the “King of Apparel Fibre”. It is playing a key role in economic, political and social affairs of the world. It is known as “white gold” due to its importance in agricultural as well as industrial economy.

It provides a livelihood to farmers and people engaged in related activity in India by way of support in agriculture, processing, and use of cotton in textiles. Apart from its value as fibre, the potential of cotton is used such as edible oil (seed oil) and cotton cake as cattle feed and hull meal. Other by-products like particle board, corrugated boxes are enormous. Cotton is one of the major kharif crop grown under both irrigated and rainfed conditions in India. Besides food and housing, clothing is one of the primary needs of human being. On an average 14.2 meter cloth is required per head per annum to fulfill clothing need. It is playing a key role in economic, political and social affairs of the world. Due to its importance in agricultural as well as industrial economy, it is also called as "white gold". All parts of the cotton plant are useful. The most important is the fiber or lint, which is used in making cotton cloth. Linters, the short fuzz on the seed provide cellulose for making plastics, explosives and other products. Linters are also incorporated into high quality paper products and processed into batting for padding mattresses, furniture and automobile cushions.

Cotton is one of the major Kharif crop grown under both irrigated and rainfed conditions in India. On one hand, cotton crop gives high economic return to the farmers, while on the other hand, there are many risks involved in it. The cultivation of cotton also needs costly inputs in terms of seeds, fertilizers and pesticides. If proper care is not taken, it proves as monetary uncertain business. It is also sensitive crop to many diseases and pests. It is known as risky crop considering natural hazards, as well as the everyday fluctuating of wholesale price index. Thus, sometimes crises involved in cotton crop create serious climatic consequences on the income and life style of the farmers.
Introduction

There are four species of cotton cultivated in India. They are: *Gossypium hirsutum* L. which covers 50.00 per cent of the total acreage of cotton and it is known as American cotton (n =26). *Gossypium arboreum* L. which covers 29.00 per cent of the total acreage of cotton in the country. It is desi cotton (n=13).; *Gossypium herbaceum* L. which covers 21.00 per cent of total acreage of cotton in the country. This species is known as desi cotton (n=13).; *Gossypium barbadense* L. which is grown in very less area *i.e.* only few thousands hectares. This species is perennial type cotton. It is also an American cotton (n= 26).

Cotton is an international crop grown by about 80 countries across the world with China, India, United States, Pakistan and Brazil being five of the largest producers of cotton. On an average, cotton is planted in an area of 329.49 lakh hectares. India is at top with 1st rank by contribution of 33.23 per cent in total area of the world. China is at 2nd position by contributing 16.02 per cent. The countries of USA, Pakistan, Uzbekistan and Brazil rank 3rd, 4th, 5th & 6th by contribution of 11.27, 9.01, 4.06 & 3.09 per cent, respectively.

It plays a vital role in the national economy by contributing 4.00 per cent to the GDP and 12.00 per cent to the country's total export earnings (Anon., 2015). Gujarat, Maharashtra, Rajasthan, Madhya Pradesh, Andhra Pradesh and Karnataka are leading cotton growing states in India. The Gujarat has 25.68 per cent share in all India production followed by Maharashtra and Andhra Pradesh with 22.50 and 21.62 per cent share, respectively. The average area production and yield of cotton is 11.69 million hectares, 36.59 million bales and 532 kg/ha, respectively (Anon., 2014).

Presently, Cotton is a freely exportable commodity from India. India exports cotton mainly to Bangladesh, China, Vietnam, Pakistan, Indonesia, Taiwan, Thailand etc. during cotton season of 2014-15 total 0.98 million metric tons of cotton was exported from the country. It is expected that the volume of cotton exports would further expand and may reach 1.16 million metric tons in 2015-16. India has now emerged as the largest producer of cotton in the world with its production touching 6021 million metric tons in 2015-16. Being the largest producer, India's cotton production and price impact the global cotton prices. Gujarat remained the top cotton producing state in the country with 108 lakh bales in 2014-15 season, even as the other states witnessed a bumper annual production (Anon., 2015).
Table 1: State wise cotton area, production and productivity of cotton (2015-16).

<table>
<thead>
<tr>
<th>State</th>
<th>Area in lakh ha</th>
<th>Production in lakh bales</th>
<th>Productivity in kg/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>6.66</td>
<td>24.00</td>
<td>613</td>
</tr>
<tr>
<td>Gujarat</td>
<td>27.19</td>
<td>97.00</td>
<td>606</td>
</tr>
<tr>
<td>Haryana</td>
<td>06.03</td>
<td>13.50</td>
<td>381</td>
</tr>
<tr>
<td>Karnataka</td>
<td>06.33</td>
<td>16.00</td>
<td>430</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>5.47</td>
<td>20.98</td>
<td>652</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>38.27</td>
<td>65.00</td>
<td>289</td>
</tr>
<tr>
<td>Odisha</td>
<td>01.25</td>
<td>04.00</td>
<td>544</td>
</tr>
<tr>
<td>Punjab</td>
<td>03.39</td>
<td>04.50</td>
<td>226</td>
</tr>
<tr>
<td>Rajsthan</td>
<td>04.48</td>
<td>13.20</td>
<td>501</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>01.42</td>
<td>03.69</td>
<td>442</td>
</tr>
<tr>
<td>Telangana</td>
<td>17.73</td>
<td>38.60</td>
<td>370</td>
</tr>
<tr>
<td>Others</td>
<td>0.50</td>
<td>01.00</td>
<td>340</td>
</tr>
<tr>
<td>All India</td>
<td>118.72</td>
<td>301.47</td>
<td>432</td>
</tr>
</tbody>
</table>


Cotton is cultivated in three distinct agro-ecological regions (north, central and south) of the country. Northern zone comprising Punjab, Haryana, parts of Rajasthan and Uttar Pradesh where hirsutum and arboretum types of cotton are grown. After the introduction of Bt. Cotton, intra-hirsutum Bt. Cotton is being extensively cultivated. Central zone comprises primarily rainfed tract of Madhya Pradesh, Maharashtra and Gujarat. Predominate area is under black soil, which is subjected to runoff, erosion, soil and nutrient losses. This area is known as Central Hirsutum, Arboretum, Herbaceum and hybrid zone. Southern zone comprising of Andhra Pradesh, Karnataka and Tamil Nadu is a zone for growing Hirsutum, arboretum, Herbaceum, barbadense and hybrid cottons. Soils of this zone are both black and red and poor in fertility. Cotton cultivation is done both under irrigated and rainfed conditions. About 70.00 per cent of cotton production is contributed by just 3 states- Gujarat, Maharashtra and Andhra Pradesh and are characterized by rainfed
cultivation coupled with aberrant precipitation pattern over the years leading to large scale fluctuation in production.

Gujarat has been the key contributor in cotton research in the country. So far as parietal improvements are concerned, the first Indo-American hybrid Deviraj was released in 1951, followed by world’s first hybrid cotton G. Cot.-4 in 1971. The first deshi hybrid cotton G. Deshi Hybrid Cotton-7 was released in 1984 and subsequently India’s first long staple deshi hybrid cotton G. Deshi Hybrid Cotton-9 in 1989.

Gujarat is divided in four well-defined cotton zone based on agro-climatic conditions. The four zones are as follows: (1) South Gujarat cotton zone: this zone comprises the entire command of Narmada river, Dangs, Surat, Valsad and part of Bharuch. (2) Middle Gujarat cotton zone: This zone covers roughly the area between the river Sabarmati in the north and the river Narmada in the south with minor adjustments, part of Bharuch, Vadodara, Kheda, Anand, Narmada, Panchmahals, Sabarkantha and part of Ahmedabad district. (3) Wagad cotton zone: This zone consists of area lying north east of the river Sabarmati, Kutch and Saurashtra excluding Mathio Tract. The Districts covered under this zone are Banaskantha, Mehsana, Surendranagar, Rajkot, Junagadh, Jamnagar and Kutch. (4) Mathio cotton zone: This zone includes Bhavanagar and Amreli districts.

Almost all the districts of Gujarat state, including Vadodara, Surendranagar, Ahmedabad, Bhavnagar, Bharuch, Kheda, Surat, Rajkot, Junagadh and Kutch are the major cotton producing districts. Surendranagar is one of the remarkable cotton growing district of the state. The farmers of the district are pioneer in introducing cotton cultivation. The district comprises of 10 talukas out of them chotila, chuda and wadhavan taluka has been considered as productivity potential region of cotton crop due to assured irrigation facilities and favourable soil and climatic conditions.

**Concept and origin of Integrated Pest Management**

IPM is a system that in context of the associated environment and population dynamics of the pest species utilizes all suitable techniques and methods in as compatible manner as possible and maintains the pest population at levels below those causing economic injury. In Integrated Pest Management both crop and pest are seen as part of a dynamic agro-ecosystem.
IPM attempts to capitalize on natural biological factors that limit pest outbreaks, only using chemicals as a last resort. The goal is to reduce the crop damage to a level where it is economically tolerable; using control measures whose cost both economic and ecological is not excessive. A number of non-chemical cultural practices form the core of IPM. But IPM does not include chemical pesticide usage it is one of weapons in the management armoury to us that can be exploited sensibly and judiciously.

Due to invention of hybrids and green revolution, use of agro-chemicals to control insect population has become inevitable. Today their indiscriminate use has created many problems. It led to imbalance in nature’s harmony, development of resistance in insects and retention of residues in vegetables and fruits and environmental pollution which ultimately threaten human and animal health. To overcome the use of chemical, biological and other control measures in an integrated manner has been advocated which is termed as IPM approach. This approach in being successfully used in Bt-cotton to control the major and minor pest. The important IPM practices are as below.

**A. Cultural practices**

1. Clean up campaign
2. Deep ploughing
3. Crop rotation
4. Use of pest tolerant hybrid varieties
5. Clean cultivation
6. Intercultivation
7. Application of recommended fertilizer dose

**B. Mechanical or physical practices**

1. Hand picking of affected plant parts
2. Clipping of terminal shoot
3. Mulching

4. Bird perches

5. Light traps

6. Pheromone traps

C. Biological control practices

1. Conservation of natural enemies like chrysoperla, lady bird beetle, wasps, bugs etc.

2. Augmentation of natural enemies

3. Use of Trichogramma pестisomus.

4. Use of chrysoperla

5. Use of HaNPV (Helicoverpa Nuclear Polyhodrosis Virus)

6. Use of Bt (Bacillus thuringiensis)

7. Use of Biopesticides like NSKE (Neem Seed Kernel Extract)

D. Chemical practices

1. ETL (Economic Threshold Level) of pests

2. Seed treatment

3. Spraying of insecticide and pesticides

1.1 STATEMENT OF THE PROBLEM

Cotton is known as “white gold” and important fibre crop of the Surendranagar district of Gujarat state, grown since long time. The cotton crop is reported heavily infested with numerous insects, pests, and diseases. The excessive indiscriminate use of hazardous pesticides has its own limitation because of the build up of resistance in certain pest.
Integrated Pest Management (IPM) is an approach that envisages combination of methods that may contribute to suppression of pest by cultural method, resistance crop varieties, conservation and augmentation of natural enemies and specific chemical pesticide as need to keep pest population level at below economic injury. Hence, it is important to know the extent of adoption of Integrated Pest Management (IPM) by cotton growers.

Therefore, it is felt necessary to conduct a study on “Knowledge and attitude of cotton growers towards Integrated Pest Management in Surendranagar district of Gujarat state”.

1.2 OBJECTIVES OF THE STUDY

The overall objective of this study was to assess the knowledge and attitude of cotton growers towards Integrated Pest Management. The specific objectives of the study are;

1. To study the personal, socio-economical, communicational and psychological characteristics of cotton growers.

2. To assess the knowledge of cotton growers regarding Integrated Pest Management.

3. To study the attitude of cotton growers towards Integrated Pest Management.

4. To find out relationship between selected characteristics cotton growers and their knowledge about Integrated Pest Management.

5. To study the relationship between selected characteristics of cotton growers and their attitude towards Integrated Pest Management.

6. To analyze the constraints faced by the cotton growers in adoption of Integrated Pest Management.

7. To seek the suggestions from the cotton growers to overcome the constraints faced by them in adoption of Integrated Pest Management.
1.3 SIGNIFICANCE OF THE STUDY

This investigation is the great significance and importance in creating data based understanding of the factors responsible for the knowledge and attitude of cotton growers about Integrated Pest Management and also the course of action to be undertaken in the future. Hence, the study was suggest several implications to the policy maker, academicians, planners, administrators, scientists and change agents to increase knowledge and create positive attitude among the cotton growers and by enhancing rate of adoption of Integrated Pest Management in cotton.

1.4 LIMITATIONS OF THE STUDY

1. The area of the study was restricted to only Surendranagar district.

2. Some selected characteristics of cotton growers were studied.

3. To study was carried out on ex-post facto design.

4. The findings were based on verbal expressions and response of the respondents.

5. The study was limited to certain aspects i.e. knowledge and attitude of cotton growers towards Integrated Pest Management.