CHAPTER I
INTRODUCTION

Agriculture is the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that nurtured the development of civilization. Agriculture is the cultivation and breeding of animals, plants and fungi for food, fiber, biofuel, medicinal plants and other products used to sustain and enhance human life. The study of agriculture is known as agricultural science. Agriculture helps to meet the basic needs of human and their civilization by providing food, clothing, shelters, medicine and recreation. Hence, agriculture is the most important enterprise in the world. It is a productive unit where the free gifts of nature namely land, light, air, temperature and rain water etc., are integrated into single primary unit indispensable for human beings. Secondary productive units namely animals including livestock, birds and insects, feed on these primary units and provide concentrated products such as meat, milk, wool, eggs, honey, silk and lac (Anon., 2017a).

Agriculture provides food, feed, fiber, fuel, furniture, raw materials and materials for and from factories; provides a free fare and fresh environment, abundant food for driving out famine; favours friendship by eliminating fights. Satisfactory agricultural production brings peace, prosperity, harmony, health and wealth to individuals of a nation by driving away distrust, discord and anarchy. It helps to elevate the community consisting of different castes and clauses, thus it leads to a better social, cultural, political and economical life. Agricultural development is multidirectional having galloping speed and rapid spread with respect to time and space. After green revolution, farmers started using improved cultural practices and agricultural inputs in intensive cropping systems with labourer intensive programmes to enhance the production potential per unit land, time and input. It provided suitable environment to all these improved genotypes to foster and manifest their yield potential in newer areas and seasons. Agriculture consists of growing plants and rearing animals in order to yield and produce thus it helps to maintain a biological equilibrium in nature (Anon., 2017a).

1.1. SCOPE OF AGRICULTURE IN INDIA

In India, population pressure is increasing while area under cultivation is static or even shrinking, which demand intensification of cropping and allied activities in two
dimensions i.e., time and space dimension. India is endowed with tropical climate with abundant solar energy throughout the year, which favours growing crops round the year. There is a vast scope to increase irrigation potential by river projects and minor irrigation projects. In addition to the above, India is blessed with more labour availability. Since agriculture is the primary sector, other sectors are dependent on agriculture. In India, major allocation has been done in each five-year plan to agriculture. In 8th five-year plan, nearly 23 per cent of the national budget allocation goes to agriculture and allied agro-based cottage industries run on small scales. More than 60 per cent of the Indian population (60 million/1.05 billion) depends or involved in agriculture and allied activities. Nearly 40 per cent of the net national product is from agricultural sector. Approximately 35 per cent employment is generated from agriculture, out of which 75 per cent is found in rural areas either directly or indirectly.

In future, agriculture development in India would be guided not only by the compulsion of improving food and nutritional security, but also by the concerns for environmental protection, sustainability and profitability. By following the General Agreement on Trade and Tariff (GATT) and the liberalization process, globalization of markets would call for competitiveness and efficiency of agricultural production. Agriculture will face challenging situations on the ecological, global climate, economic equity, energy and employment fronts in the years to come (Anon., 2017a).

1.2. WHEAT CULTIVATION

Wheat (Triticum aestivum L. em Thell.) is the first important and strategic cereal crop for the majority of world’s populations. It is the most important staple food of about two billion people (36 per cent of the world population). Worldwide, wheat provides nearly 55 per cent of the carbohydrates and 20 per cent of the food calories consumed globally. It exceeds in acreage and production every other grain crop (including rice, maize, etc.) therefore, the most important cereal grain crop of the world, which is cultivated over a wide range of climatic conditions and the understanding of genetics and genome organization using molecular markers is of great value for genetic and plant breeding purposes (Anon., 2017b).

The grass family Poaceae (Gramineae) includes major crop plants such as wheat (Triticum aestivum L.), barley (Hordeum vulgare L.), oat (Avena sativa L.), rye (Secale cereale L.), maize (Zea mays L.) and rice (Oryza sativa L.). Triticeae is one of the tribes
containing more than 15 genera and 300 species including wheat and barley. Wheat belongs to the tribe Triticeae (= Hordeae) in the grass family Poaceae (Gramineae) (Briggle and Reitz, 1963) in which the one to several flowered spikelets are sessile and alternate on opposite sides of the rachis forming a true spike. Wheats (Triticum) and ryes (Secale) together with Aegilops, Agropyron, Eremopyron and Haynaldia form the subtribe Triticineae (Anon., 2017b).

Linnaeus in 1753 first classified wheat. In 1918, Sakamura reported the chromosome number sets (genomes) for each commonly recognized type. This was a turning point in Triticum classification. It separated wheat into three groups. Diploids had 14 (n=7), tetraploids had 28 (n=14) and the hexaploids had 42 (n=21) chromosomes. Bread wheat is Triticum aestivum. T. durum and T. compactum are the other major species. All three are products of natural hybridization among ancestors no longer grown commercially (Anon., 2017b).

1.2.1. Cultivation and use of the wheat crop

Wheat is an edible grain, one of the oldest and most important of the cereal crops. Though grown under a wide range of climates and soils, wheat is best adapted to temperate regions with rainfall between 30 and 90 cm. Winter and spring wheats are the two major types of the crop, with the severity of the winter determining whether a winter or spring type is cultivated. Winter wheat is always sown in the fall; spring wheat is generally sown in the spring but can be sown in the fall where winters are mild. Therefore, today wheat is grown all over the world, with different varieties sown according to the various climates (Anon., 2017b).

In 2002, the world’s main wheat producing regions were China, India, United States, Russian Federation, France, Australia, Germany, Ukraine, Canada, Turkey, Pakistan, Argentina, Kazakhstan and United Kingdom (FAO, 2003). Most of the currently cultivated wheat varieties belong to hexaploid wheat (Triticum aestivum L.), which is known as common bread wheat and valued for bread making. The greatest portion of the wheat flour produced is used for bread making. Wheat grown in dry climates is generally hard type, having protein content of 11-15 per cent and strong gluten (elastic protein). The sticky gluten of bread wheat entraps the carbon dioxide (CO2) formed during yeast fermentation and enables leavened dough to rise. The hard type of wheat produces flour best suited for bread making. The wheat of humid areas
is softer, with protein content of about 8-10 per cent and weak gluten. The softer type produces flour suitable for cakes, crackers, cookies, pastries and household flours. Durum wheat (Triticum turgidum L.), which is the main tetraploid type, is also important, although its large, very hard grains yield low gluten flour that is the main source of semolina suitable for pasta, couscous, burghul and other Mediterranean local end-products (Anon., 2017b).

Apparently, no economically important diploid wheats are being cultivated as a crop anywhere in the world. Although most wheat is grown for human food and about 10 per cent is retained for seed and industry (for production of starch, paste, malt, dextrose, gluten). Wheat grain contains all essential nutrients; kernel contains about 12 per cent water, including carbohydrates (60-80 per cent mainly as starch), proteins (8-15 per cent) containing adequate amounts of all essential amino acids (except lysine, tryptophan and methionine), fats (1.5-2 per cent), minerals (1.5-2 per cent), vitamins (such as B complex, vitamin E) and 2.2 per cent crude fibers (Anon., 2017b).

1.2.2. Indian scenario

Wheat is grown in India in an area of about 30 Million ha. with a production of 93 Million tonnes. The normal national productivity is about 2.98 tonnes/ha. The major Wheat producing states are Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Rajasthan, Bihar, Maharashtra, Gujarat, Karnataka, West Bengal, Uttarakhand, Himachal Pradesh and Jammu & Kashmir. These States contribute about 99.5 per cent of total Wheat production in the country. Remaining states, namely, Jharkhand, Assam, Chhattisgarh, Delhi and other North Eastern states contribute only about 0.5 per cent of the total Wheat production in the country.

It would be seen from given Table 1.1. that in terms of area, the state of Uttar Pradesh stands first followed by Madhya Pradesh, Punjab, Haryana, Rajasthan, Bihar, Maharashtra, Gujarat. In terms of production, U.P. occupies first place followed by Punjab, Haryana, Madhya Pradesh, Rajasthan, and Gujarat. The contribution of these states in the production is about 99.5 per cent. The contribution of other States is minimal. As regards to the productivity, Punjab stands first (4693 Kg/ha.) followed by Haryana (4624 Kg/ha.), Gujarat (3155 Kg/ha.), Uttar Pradesh (3113 Kg/ha.), Rajasthan (2910 Kg/ha.), Madhya Pradesh (1757 Kg/ha.).
Table 1.1. Area, production and productivity of Wheat in major Wheat growing states of India (2010-11)

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>State</th>
<th>Area (lakh ha.)</th>
<th>Production (lakh MT)</th>
<th>Yield (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Uttar Pradesh</td>
<td>96.370</td>
<td>300.010</td>
<td>3113</td>
</tr>
<tr>
<td>2</td>
<td>Madhya Pradesh</td>
<td>43.410</td>
<td>76.271</td>
<td>1757</td>
</tr>
<tr>
<td>3</td>
<td>Punjab</td>
<td>35.100</td>
<td>164.720</td>
<td>4693</td>
</tr>
<tr>
<td>4</td>
<td>Haryana</td>
<td>25.150</td>
<td>116.300</td>
<td>4624</td>
</tr>
<tr>
<td>5</td>
<td>Rajasthan</td>
<td>24.792</td>
<td>72.145</td>
<td>2910</td>
</tr>
<tr>
<td>6</td>
<td>Gujarat</td>
<td>12.740</td>
<td>40.195</td>
<td>3155</td>
</tr>
</tbody>
</table>

(Source: Anon., 2017b)

1.2.3. World scenario

The total area under Wheat in the world is around 225.62 million ha. with a production of 685.6 million tonnes (2009-10). The normal world productivity is 3039 Kg/ha. The major Wheat producing countries are China, India, USA, France, Russia, Canada, Australia, Pakistan, Turkey, UK, Argentina, Iran and Italy. These countries contribute about 76 per cent of the total world Wheat production.

Table 1.2. Area, production and yield of major crop growing countries (2009-10)

<table>
<thead>
<tr>
<th>Country</th>
<th>Area (lakh ha)</th>
<th>Production (lakh MT)</th>
<th>Productivity (kg/ha)</th>
<th>% to world production</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>242.91</td>
<td>1151.15</td>
<td>4739</td>
<td>16.79</td>
</tr>
<tr>
<td>India</td>
<td>277.50</td>
<td>806.80</td>
<td>2907</td>
<td>11.77</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>266.33</td>
<td>617.40</td>
<td>2318</td>
<td>9.01</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>201.81</td>
<td>603.14</td>
<td>2989</td>
<td>8.80</td>
</tr>
<tr>
<td>France</td>
<td>51.47</td>
<td>383.32</td>
<td>7447</td>
<td>5.59</td>
</tr>
</tbody>
</table>

(Source: Anon., 2017b )

From the above Table 1.2. shows that India stands first in area and second in production next to China in the world. The India’s share in world Wheat area is about 12.40 per cent, whereas it occupies 11.77 per cent share in the total world Wheat
production. There is hardly any scope for expansion of area under Wheat. The main emphasis would be on increasing the productivity of Wheat by adopting the improved cultivation practices.

1.3. FERTILIZER INDUSTRY

The fertilizer industry is one of the most energy intensive sector within Indian economy and is therefore of particular interest in the context of both local and global environment discussions. Increase in productivity of this good with the use of cleaner and more efficient technologies in the manufacturing sector will be most effective immerging economic, environment and social development objectives. Being the backbone of agricultural productivity, the role of fertilizers will always remain crucial. In developing countries like India, with increase in demand for food the demand for fertilizer supply has experienced an upward shift (Anon., 2017c).

Fertilizers production in India is nutrient wise. The three main nutrients nitrogen (urea), phosphate and potash are used for fertilizers creation. Urea, ammonium sulphate, calcium ammonium nitrate (CAN) and ammonium chloride are the nitrogenous fertilizers produced in India and single super phosphate (SSP) is the only phosphatic fertilizer that is produced in India. Additionally, nutrients are combined to produce several complex fertilizers. Production of complex fertilizers include DAP (Di-ammonium Phosphate), several grades of nitro phosphates and NPK complexes. Urea, DAP, SSP (single super phosphate) and MOP (muriate of potash) are the most commonly used fertilizers. Among these, urea and DAP are the main fertilizers that are produced indigenously. Due to the lack of viable resources or reserves of potash in India, the entire feedstock requirement for potassic fertilizers are imported. Thus, Potash based fertilizer demand is entirely met by imports, for phosphate fertilizer raw materials are imported and lastly natural gas and LNG (liquid natural gas) are being imported for urea fertilizer production. In India, technical problems, power shortages and stringent government policies lead to problems in production expansion (Anon., 2017c).

Indian fertilizer industry is one industry with immense scopes in future. India is primarily agriculture oriented country and its economy is highly based on the agrarian produce the agricultural sector and its other associated spheres provide employment to a large section at the country’s population and share about 25 per cent to the GDP. The
Indian fertilizer industry is one of the allied sectors of the agricultural sphere. India has emerged as the third largest producer of nitrogenous fertilizers. The adoption of book to break five year plan has paved the way for self-sufficiency in the production of food grains. In recently production has gone up to an extent that there is scope for the export at food reins. The surplus has been foliated by the way of chemical fertilizers. The large scale use of chemical fertilizers has been instrumental in bringing about the green revolution in India. The fertilizer industry in India began its journey way back in 1906. During this period the first single super phosphate factory was established in Rani pet in Chennai (Anon., 2017c).

1.3.1. History of fertilizer industry

Fertilizer in the agricultural process is an important area of concern. The industry had a very humble beginning in 1906, when the first manufacturing unit of SSP (single super phosphate) in Rani pet near Chennai with a capacity of 6000 MT a year was established. FACT (fertilizer & chemicals travancore of India Ltd.) at Cochin in Kerala and FCI (Fertilizer Corporation of India) in Sindri in Bihar were the first large sized plants set up in forties and fifties with a view to establish industrial base and attain self-sufficiency in food grains. An impetus to the growth of fertilizer industry in India was given by green revolution in sixties. At present there are 57 large scale fertilizer units. The units manufacture an extensive range of phosphate, nitrogenous and complex fertilizers 29 at these 57 units are engaged in the manufacturing of urea while is of them produce calcium ammonium nitrate and ammonium sulphate. The remaining 20 fertilizer plants produce complex fertilizer and DAP. There is also a member of medium and small scale industries in operation. Further a significant addition to the production was witnessed in seventies and eighties. The fertilizer industry has played a majors role in achieving self-sufficiency in food grains as well as in rapid and sustained agricultural growth (Anon., 2017c).

The growth of Indian fertilizer industry has been largely determined by the policies pursued by the government which mainly confine to control the pricing, distribution and movement of fertilizers. The industry is capital intensive and the production process is energy intensive with the combined cost of feedstock and fuel accounting for anywhere between 55 and 80 per cent of cost of production, depending on the type of fertilizers. The rapid buildup of fertilizer production capacity in the
country has been achieved as a result of a favorable policy environment facilitating large investments in the public, co-operative and private sectors (Anon., 2017c).

1.3.2. Growth of fertilizer industry

The Indian fertilizer industry has come a long way since the setting up of the manufacturing unit of single super phosphate (SSP) near Chennai in 1906. A new impetus to the growth of Indian fertilizer industry was provided by the set up the two fertilizer plants – Fertilizer and Chemicals Travancore of Indian Limited (FACT) in Kerala and the fertilizer corporation of India (FCI) in Bihar. This was during the forties and the fifties. The aim was to create an industrial base that would provide India with self-reliability in food grains. With the effect from 25th July 1991, the government implemented three major policy decisions (1) decontrol of ammonium sulphate CAN and ammonium chloride (2) increase in the selling prices of all other fertilizer by 40 per cent and (3) introduction of a subsidy ceiling on SSP (Anon., 2017c).

However within a span of three weeks, the government revised the extent of the price like to 30 per cent with effect from 14th August 1991 and exempted the small and marginal farmers from it completely. With effect from 25th August 1952, the government de controlled all phosphate and potassic fertilizers and abolished the RPS covering the farmers brought back ammonium sulphate. An ammonium chloride with the purview of the control and subsidy and rescued the selling price of urea by 10 per cent while returning this under control of the RPS. These policy changes were expected to achieve (1) reduction in subsidy (2) continued growth in food grain production and (3) keeping healthy soil intact. Unfortunately none of these could be achieved. India witnessed significant growth of the fertilizer Industry during the sixties and the seventies (Anon., 2017c).

By 2003, India has an installed capacity of 12.11 million MT of nitrogen and 5.36 million MT of phosphate. Today with 57 large sized fertilizer plants manufacturing a wide variety of the nitrogen, complex phosphate. Fertilizers the India fertilizer industry is the 3rd largest producer in the world. One of the major factors that have led to the rapid increase in the production capacity of fertilizers in India is the policy environment. With the formulation and implementation of investor friendly policies large investment poured in to the private public and co-operative sector’s and this and this propelled the growth of the Indian fertilizer industry. Reports showed the total installed capacity of fertilizer production in 2004 to be 119.60 LMT of nitrogen and
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53.60 LMT of phosphate. These figures went up to 120.61 LMT of nitrogen and 56.59 LMT of phosphate in 2007. The production of fertilizers was 113.54 LMT of nitrogen and 42.21 LMT of phosphate during 2005-06. Indian fertilizer has reached international levels of capacity utilization by adopting various strategies for increasing the productions of fertilizers (Anon., 2017c).

Expansion and increase in efficiency through modernization and revamping of existing fertilizer units. Using alternative source such as coal or liquefied natural gas for the production of fertilizer especially urea. Reviving some of the closed fertilizers plants. Establishing joint venture projects with companies in countries. In order to meet the demand for gas this is one of the prime requirement for the production of nitrogenous fertilizers. India has entered into joint ventures with foreign companies in number of countries. Joint ventures have also been established for the supply of phosphoric acid. Indian fertilizer manufacturing companies has joined hands with companies in Senegal Oman, Jordan, Morocco, Egypt, Tunisia and other countries. It is therefore evident that the Indian fertilizer industry has witnessed extensive growth and development in short span of time. With such extensive growth it is not surprising that the India ranks Germany, the leading fertilizer manufacturing countries of the world (Anon., 2017c).

The India government has devised policies conducive to the manufacture and consumption of fertilizers. Numerous committees have been formed by the Indian government to formulate and determine fertilizer policies. The dramatic development of the fertilizer industry and the rise in its production capacity has largely been attributed to the favourable policies. This has resulted in large scale investment in all three sector viz. public, private and co-operative (Anon., 2017c).

At present there are 57 large scale fertilizer units. These manufacture an extensive large of phosphates, nitrogenous and complex fertilizers. 29 of these 57 units are engaged in the manufacturing of urea, while 13 of them produce calcium ammonium nitrate and ammonium sulphate. The remaining 20 fertilizer plants manufacture complex fertilizer and DAP. There are also about 12 medium and small scale industries in operation. The department of fertilizer is responsible for the planning promotion and development of the fertilizer industry. It also takes into account the import and distribution of the fertilizer and also the financial aspect. There are four main divisions of the department. These include fertilizer imports, movement and
distribution, finance and accounts fertilizers projects and planning and administration and vigilance. It makes an assessment of the individual requirements of the states and Union Territories and those lays out an elaborate supply plan. Though the soil of India is rich slit, it lacks chief plant nutrients like potassium, nitrogen and phosphate. The increase in the production of fertilizer and its consumption acts as a major contributor to overall agricultural development (Anon., 2017c).

The installed capacity has reached to a level of 132.58 LMT in respect of nitrogen and 70.60 LMT in respect of phosphatic nutrient in the year 2014-15, making India the 3rd largest fertilizer producer in the world. The rapid buildup of fertilizer production capacity in the country has been achieved as a result of a favourable policy environment facilitating large investments in the public, co-operative and private sectors (Anon., 2017c).

At present, there are 30 large size urea plants in the country manufacturing urea, 21 units manufacturing DAP and complex fertilizers and 2 units manufacture ammonium sulphate as a byproduct. Besides, there are 97 medium and small-scale units in operation producing single super phosphate (SSP). The sector-wise installed capacity is given in the table below:

**Table 1.3. Sector wise installed capacity**

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Sector</th>
<th>Capacity (LMT)</th>
<th>Percentage share</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>P</td>
</tr>
<tr>
<td>1</td>
<td>Public sector</td>
<td>37.64</td>
<td>3.87</td>
</tr>
<tr>
<td>2</td>
<td>Cooperative sector</td>
<td>36.38</td>
<td>17.13</td>
</tr>
<tr>
<td>3</td>
<td>Private sector</td>
<td>58.56</td>
<td>49.60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>132.58</td>
<td>70.60</td>
</tr>
</tbody>
</table>

(Source: Anon., 2017c)

1.4. INTRODUCTION OF WATER SOLUBLE FERTILIZER

Fertilizer plays important role in crop cultivation. Fertilizer enhances the growth of crop which ultimately results into higher yield. Now a day’s water soluble fertilizer has vital role in crop cultivation especially in case of fruits and vegetable. As water soluble fertilizer leads to fast absorption of nutrients and carriers. It can meet specific
crop demands at particular crop growth period, which ultimately helps in development at various physiological stages of the crop. The fertilizer industry had a very humble beginning in India in 1906. The Indian fertilizer industry has succeeded in meeting almost fully the demand of all fertilizers.

Water soluble fertilizers are very essential for better crop growth yet it is not gain popularity in India. In India water soluble fertilizers are mainly use in fruits and vegetables cultivation. In Gujarat annually, almost 38 to 40 lakh MT of fertilizers are consumed while total consumption of water soluble fertilizers in India is 1,10,000 MT (Anon., 2017d).

1.4.1. Magnesium sulphate as fertilizer

In gardening and other agriculture, magnesium sulfate is used to correct a magnesium or sulfur deficiency in soil; magnesium is an essential element in the chlorophyll molecule, and sulfur is another important micronutrient. It is most commonly applied to potted plants, or to magnesium-hungry crops, such as potatoes, roses, tomatoes, lemon trees, carrots, and peppers. The advantage of magnesium sulfate over other magnesium soil amendments (such as dolomitic lime) is its high solubility, which also allows the option of foliar feeding. Solutions of magnesium sulfate are also nearly neutral, compared with alkaline salts of magnesium as found in limestone; therefore, the use of magnesium sulfate as a magnesium source for soil does not significantly change the soil ph. Magnesium is abundant in the earth's crust. It is found in a wide variety of minerals. Magnesium becomes available for plant use as these minerals weather or break down. The majority of the soils in western minnesota have naturally high levels of magnesium. For the acid soils of the eastern counties, the addition of dolomitic limestone in the crop rotation, when needed, should supply adequate magnesium for crop growth. Magnesium is held on the surface of clay and organic matter particles. Although this exchangeable form of magnesium is available to plants, this nutrient will not readily leach from soils (Anon., 2017d).

1.4.2. Uses of magnesium sulphate

Magnesium Sulphate is necessary nutrient elements in the process of growing plant. It is the center element of chlorophyll photosynthesis can’t go on without it. It is the activating agent of many enzymes, and has a big effect for carbon metabolism,
nitrogen metabolism, fat and active oxide action of the plant. Magnesium fertilizers is perfect for the acid soil, highly leaching soil, sandy soil.

1.4.2.1. Magnesium sulphate for livestock

It can be used for feed which add nutrition, for strengthen pig’s resistance and improve meat also improve the quality and quantity of dairy production.

1.4.2.2. Magnesium sulphate for food

Magnesium can be used as food additives, processing acids such as nutritional supplements, curing agent, flavor enhancers and brewing.

1.4.2.3. Magnesium sulphate for medicine

It can be used for obstetric and treatment of digestive disease, surgery and anti-inflammatory analgesic and so on.

1.4.2.4. Magnesium sulphate for industry

It can be used for disposing printing and dyeing waste water, for whiten delinked pulp of waste newspaper, increasing the coloring degree of ink formulations, synthesizing organic sulfide and magnesium stearate, for drying organic solvents, increasing antifreeze capacity of concrete.

1.4.2.5. Magnesium sulphate for daily life

For making skin smooth, used for oily hair, curing mosquito bites, for water gel and hair gel Use, water gel and hair gel, water getting rid of blackhead and acne.

1.5. COMPANY PROFILE

T. J. Agro Chemicals & Fertilizers Pvt. Ltd. engaged in manufacturing products like N. P. K. granulated fertilizers, single super phosphate fertilizer & magnesium sulphate heptahydrate. We have production facilities at Junagadh (Sukhpur), Navsari & Vadodara. “Providing best quality fertilizer products to farmers” is their USP. Company is one of the market leaders in the state of Gujarat and also engaged in trading of fertilizers like Urea, DAP, MOP etc. T. J. Agro Fertilizers Pvt. Ltd. Has successfully defined its objectives & positioned itself as one of the leading companies in the Fertilizer industry. Company is always acknowledged as a reliable fertilizer company by discerning & quality conscious market.
In addition to customer satisfaction achieved by providing desired quality products as well as timely delivery. Company strives towards building long term relationships with their stake holders, customers as well as suppliers. Company follow all quality clients constrain while dealing in products and with clients. Company’s motive is to accommodate the best of agriculture products to their global customers at reasonable prices, to deliver world class quality and cost effect. And their focus is almost on customers delight. The main motive of the company is to engage activities in the field of agriculture products for export and import fertilizers.

1.6.1. History of company

T. J. Agro Fertilizers Pvt. Ltd. was established in year 1986 at Junagadh. Company had started production of N.P.K. granulated fertilizers. After success of this business, company planned for new venture in year 1996. T. J. Agro Fertilizers Pvt. Ltd. (Unit -2) was established for production of N.P.K. granulated fertilizers at Navsari in year 1996 for satisfying the customer need of south Gujarat. New plant for N.P.K. granulated fertilizers was established in year 1998 in same premises to fulfill the market requirement of N.P.K. granulated fertilizers in south Gujarat. In last quarter of year 2003, company established a new plant for production of single super phosphate (SSP). This setup was done to integrate N.P.K. granulated fertilizers’ production, as SSP is a raw material for production of N.P.K. granulated fertilizer.

Recently in year 2008, company established production facility of magnesium sulphate, at Vadodara. Magnesium sulphate is micro-nutrient fertilizer. Company is keeping pace with market trends as well as market requirements by entering into different segments of fertilizer products. For last 30 years, company has enhanced the business widely. Manned by well equipped & talented manpower, the company has developed a rapid pace keeping in trend with latest developments and technology to improve its quality. Recent position of company is joint adventurous efforts of family members as well as employees’ hard work.

1.6.2. Company’s mission

To create excellent customer experience by providing best quality fertilizer products to farmers that help them in finding world class agriculture solutions.
1.6.3. Company’s vision

“Be a leader and model corporate participant in the development of the agriculture industry.”

1.6.4. Company’s goal

- Be the preferred supplier to the markets they serve
- Maximize long-term stakeholder value.
- Build strong relationships with and improve the socio-economic well-being of society.
- Attract and retain talented, motivated and productive employees who are committed to their long-term goals.
- Prevent harm to people and damage to the environment.

1.6.5. Company’s products

The products produced in T. J. Agro are NPK granulated, Magnesium sulphate, and single super phosphate under the brands name agrophos, indomag, bail (ox) respectively. Also engaged in trading of fertilizers like Urea, DAP, MOP etc. packaging size is similar in all products.

1.6.6. Organization chart

There is one chairman in organization under whom administration, production, marketing and finance manager works. They are monitoring production department, marketing department, administrative department and finance department. Maintaining a clean and enjoyable working environment. Administration department engaged with handling external or internal communication or management systems. Managing clerical or other administrative staff and organizing, arranging and coordinating meetings. Production is the functional area responsible for turning input into finished outputs through a series of production processes. The production manager is responsible for making sure that raw materials are provided and made into finished goods effectively. A marketing department promotes their business and drives sales of its products or services. It provides the necessary research to identify their target customers. The finance department in an organization oversees financial planning and management activities including budgeting, forecasting, reporting, compliance and creation of value. Under administrative department there are an assistant who helps his
department and under assistant there are three men. In production department, store keeper and plant operator are works under production manager. And under store keeper one assistant and labour are working. In marketing department, one assistant is there under whom four men and one labour are working. And in finance department one assistant is working.

![Organization structure of T. J. Agro Pvt. Ltd.](image)

1.6.7. Distribution channel

Company has wide market in Gujarat. There is also market in Chhattisgarh and Maharashtra. T.J. Agro has adopted one level distribution channel i.e. company has appointed dealers in different market segment. As they received the orders, dealers directly contact with marketing officer through phone or fax and place the order to company. Then company meet the demand with proper supply.
1.6.8. Branding image

A brand name is an organization’s most valuable asset because it provide customer with a way of recognizing and specifying a particular products. T. J. Agro Fertilizers has a brand name ‘AGROPHOS’ for NPK granulate Fertilizers. ‘INDOMAG’ for magnesium sulphate and ‘BAIL(OX)’ for single super phosphate. The other most important thing happened during years of famine. The company has given the best quality of fertilizers and the percentage given are complete of NPK. This act has earned all farmers’ faith for brand image of company.

1.6.9. Payroll system

Workers are appointed on contract basis. Company is giving wages to workers on hourly basis. Rate of per hour is fixed in advance. Wages are given weekly to workers. Payment system for workers is:

$$\text{Total no. of hours} \times \text{hourly rate}$$

Staff salary is paid to the staff to the 5th of every month by Cheque. Salary includes basic salary, status of employee, educational allowance, dearness allowance, medical allowance.

1.6.10. Transportation

For delivery of goods company has its own 4 trucks. Transportation policy of company’s truck is only for the area within the range of Junagadh. All responsibilities of delivering the goods till the customers are of company. Area i.e. ahead from Junagadh, company makes the arrangements with private Transportation Company.

1.6.11. Need to hold inventory

There are two general motives to holding inventory:

1. Transaction Motive:

   This motive emphasizes the need to maintain inventories to facilitate smooth Production and sales operations.

2. Precautionary motive:

   This motive necessitate holding of inventories to guard against the risk of unpredictable changed in the demand and supply forces and factors.
1.6.12. Agency business

As company has got established marketing network in the State of Gujarat, Company invite other manufacturer of fertilizers to take the advantage of T. J. Agro’s wide marketing network by giving company the dealership of other company. Company have already having dealership of Indian Potash Limited, Rashtriya Chemicals & Fertilizers Ltd, Chambal Fertilizers & Coromandel International Ltd.

1.7. PRACTICAL UTILITY OF THE RESEARCH STUDY

This report will help to find out which factors affecting consumption of fertilizers to the farmers. Resource use efficiency helps in maximizing the supply of fertilizer and drawn on organization in order to function effectively, with minimum wasted of resource expenses. Purchasing and consumption pattern of fertilizers indicate how consumers purchase goods or services which are highly susceptible to change and the use of goods and services by households in case of fertilizer. By the conjoint analysis company can know farmers’ preference and can change their policy according to the preferences of consumer. This study will help to determine how company can improve their quality and make product available to the farmers in the best possible way.

1.8. OBJECTIVES

The present study was fulfilled with following objectives.

1. To study socio economic profile of farmers in Junagadh district
2. To identify the factors influencing the consumption of magnesium fertilizer
3. To study the resource use efficiency of wheat growers
4. To analysed brand preference of farmers toward magnesium sulphate
5. To analyse purchase and consumption pattern of magnesium sulphate users

1.9. LIMITATIONS OF THE STUDY

1. This survey was restricted to Junagadh district only.
2. The sample size for the survey was limited which may not be representing the whole district.
3. The result was totally derived from the respondent’s answer. There might be a different between the actual and project results.