CHAPTER - I
INTRODUCTION

1.1 STATEMENT OF PROBLEM

India is the foremost country in production, consumption and export of spices. Hence, it is popularly known as “Spice Basket or Land of Spices”. Seed spices are cash, economy and revenue crops. They are export oriented commodities and are source of foreign exchange earnings to the country. They possess industrial importance.

The major seed spices are pepper, cardamom, chilli, ginger, turmeric, cumin, coriander, fennel and fenugreek and minor seed spices are ajowain, nigella, aniseed, dill, caraway, cloves and celery.

Among seed spices coriander is a native of Southern Europe and Asia minor. According to early Sanskrit writings, coriander was known as far back as 5000 BC for its cultivation in India. Persia grew coriander 3000 years ago for adding fragrance to hanging garden of Babylon and seeds were found in Egyptian tombs of 960 BC. It has been used as an ingredient to traditional and folk medicine in the Middle East and Asia for more than 2000 years.

Coriander (Coriandrum sativum L.), belonging to family Apiaceae is a herbaceous plant widely grown in most of the states of India as a spice crop. This species has 22 chromosomes. The stems, leaves and fruits have a pleasant aromatic flavour and thus used in flavouring different kinds of foods and beverages worldwide. Coriander is commercially cultivated in India, Morocco, Russia, Hungary, Poland, Romania, Bulgaria, Mexico and USA. The value added products of coriander are coriander powder, essential oil and oleoresins.

Coriander is an aromatic and soft plant growing to 50 cm tall. The leaves are variable in shape, broadly lobed at the base of the plant, and slender and feathery higher on the flowering stems. The flowers are borne in small umbels, white or very pale pink, asymmetrical, with the petals pointing away from the centre of the umbel longer (5-6 mm). The fruit is a ovate globular, dry schizocarp with two mericarps,
multiple longitudinal ridges on the surface possessing a sweet, slightly pungent, citrus like flavor with a hint of sage 3-5 mm in diameter. Coriander fruit contains about 0.2 % - 1.5 % of volatile oil and 13 % - 20 % of fat oil; however, it has been recorded that some cultivars contain up to 2.6 % of volatile oil as has been reported by Zawislak, the essential oil content ranged 1.87% - 2.33%. The fatty oil composition of ripe fruits mainly includes petroselinic acid (68.8%), linoleic acid (16.6%), oleic acid (7.5%) and palmitic acid (3.8%). The hydro-distillation of C. sativum L. aerial parts gave essential oils at vegetative, full flowering, green fruit (immature) and brown fruit (mature) with a yield of 0.14%, 0.23%, 0.37% and 0.31% (w/w), based on dry weight, respectively.

Coriander (Coriandrum sativum L.) is one of the major seed spices grown in India. India is the largest producer of coriander in the world and is mainly cultivated in Rajasthan, Gujarat, Andhra Pradesh, Madhya Pradesh, Tamil Nadu, Orissa, Karnataka, Uttar Pradesh and Bihar producing 883000 MT from 674000 hectares (NHB, 2016-17). In Gujarat state cultivation area of coriander is 121199 ha and production is 189518 MT. Among different districts of Gujarat, Junagadh gave highest share in the production of coriander (77619 MT) in 2016-17. Beside, domestic consumption, the crop has export potential. At present only five per cent of the total produce is exported. The meagre quantity of export may be due to low productivity and inability to withstand international quality standards of the produce. Therefore, there is a need to upgrade the quality and productivity so that it can withstand competition at the international market.

All parts of the coriander plant are edible, but the fresh leaves and the dried seeds are the parts most traditionally used in cooking. Coriander is used in cuisines throughout the world. The leaves are variously referred to as coriander leaves, dhania, Chinese parsley or cilantro. In Indian and Central Asian recipes, coriander leaves are used in large amounts and cooked until the flavour diminishes. The leaves spoil quickly when removed from the plant and lose their aroma when dried or frozen. The dry fruits are known as “coriander seeds” when used as a spice. The seeds have a lemony citrus flavour when crushed, due to terpenes, linalool and pinene. It is described as warm, nutty, spicy and orange-flavoured. Coriander is commonly found both as whole dried seeds and in ground form. Roasting or heating the seeds in a dry pan heightens the flavour, aroma and pungency. Ground coriander seed loses flavour
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quickly in storage and is best ground fresh. Coriander seed is a spice in garam masala and Indian curries which often employ the ground fruits in generous amounts together with cumin acting as a thickener in a mixture called “dhana jeera.” Roasted coriander seeds, called “dhana dal” are eaten as a snack. They are the main ingredient of the two south Indian dishes sambar and rasam. The nutritional profile of coriander seeds is different from the fresh stems or leaves. Leaves are particularly rich in vitamin A, vitamin C and vitamin K with moderate content of dietary minerals. Although seeds generally have lower content of vitamins, they do provide significant amounts of dietary fiber, calcium, selenium, iron, magnesium and manganese.

Here some of the health benefits of coriander leaves. A very good food for digestive system, coriander promotes liver functions and bowel movements. Coriander is good for diabetes patients. It can stimulate the insulin secretion and lower the blood sugar levels. Vitamin K in it is good for the treatment of Alzheimer’s disease. The fat soluble vitamin and antioxidant- vitamin A, protects from lung and cavity cancers. Coriander contains anti-inflammatory properties. This is why it is good against inflammatory diseases such as arthritis. Coriander’s anti-septic properties help to cure mouth ulcer. Coriander is good for the eyes. Antioxidants in coriander prevent eye diseases. It’s good remedy in the treatment of conjunctivitis. Coriander seeds are especially good for the menstrual flow. It’s very good herb to promote the nervous system. It can stimulate the memory. Coriander helps those suffering from anaemia. Coriander contains high amounts of iron, which is essential for curing anemia.

Green revolution has greatly increased the food production in India, but continuous use of high yielding varieties has led to depletion of native micronutrient status of soil and soil fertility and most of the soils are showing sign of fatigue for sustaining higher crop production. In recent years, micronutrients are considered as one of the constraints in the optimum production of crops. Singh (2008) reported that 48, 12, 5, 4, 33, 13 and 41 % soils of India are deficient in Zn, Fe, Mn, Cu, B, Mo and S, respectively.

Zinc plays a significant role in various enzymatic and physiological activities of the plant body. Zinc catalyses the process of oxidation in plant cells and plays a vital role in transformation of carbohydrates, regulates the consumption of sugar,
increases the source of energy for the production of chlorophyll, adds in the formation of auxins and promotes absorption of water. It acts as a component of enzyme carbonic anhydrase, which is a catalyst that serves to decompose carbonic acid to carbon dioxide and water, and it is also necessary for the formation of amino acid and tryptophane. Zinc it self involve in the formation of IAA hormone (Wear and Hagler, 1968).

The Fe is a structural component of porphyrin molecules, cytochromes, heams, hematin, ferrichrome and legheamoglobin involved in oxidation reduction reactions in respiration or in root reduces. It is an important part of the enzyme nitrogenase which is essential for nitrogen fixation through nitrogen fixing bacteria. Iron in chloroplast reflects the presence of cytochromes which is performing various photosynthetic reduction processes.

1.2 OBJECTIVES OF STUDY

Looking to the above facts, the present studies on “Effect of zinc and iron on growth and yield of coriander (Coriandrum sativum L.) has been under taken with following objectives.

1. To study the effect of soil and foliar application of Zn and Fe on growth and yield of coriander.
2. To study the effect of soil and foliar application of Zn and Fe on content and uptake of nutrient by coriander crop and post harvest soil fertility.
3. To work out economics of different treatments.

1.3 ASSUMPTIONS OF STUDY

Zinc and iron or micronutrient elements, however they are more important even in small quantity for crop growth and yield. Zinc play central role in healthy plant metabolism and growth processes. Zinc is not needed in as large amounts as nitrogen, potassium or phosphorus however, zinc and iron play important role in improvement of quality, recreation of enzymatic process and the chlorophyll. Zinc is needed for the creation of the plant growth hormone auxin and for creation of the green chlorophyll and cytochrome pigments. Zinc also has a role in formation of enzymes and carbohydrates, regulation of starches and proper root development.
Iron is mainly involved in the process of plant photosynthesis. Iron plays an important role in respiration, photosynthesis and the production of healthy green leaves. These above processes may ultimately reflect increase in crop growth and biological yield.

1.4 LIMITATIONS OF STUDY

This study was carried out in a calcareous soil of Saurashtra region in a limited plot size for one season only. Although soil system is dynamic one respond differently under different environmental factors. Thus the results may have a differential expression for zinc and iron application on coriander crop growth and yields under the changing soil environmental conditions.