CHAPTER- I

INTRODUCTION

A spice is a dried seed, fruit, root, bark or vegetative substance used in flavouring, seasoning and imparting aroma in variety of food items and beverages. In India, wide varieties of spices are grown and many of them are native of the subcontinent and also known as “Home of Spices”. Besides, importance in food industry, the seed spices have medicinal properties and thus are used in various pharmaceutical preparations and also in cosmetic industry. The usages of spices by consumers are increasing world-wide because they are completely natural rather than artificial additives for seasoning and flavouring of foods. Thus, an increasing trend in export of seed spices has been observed in the last decade particularly to Asian, Latin American and Middle Eastern developing countries.

India exports raw spices as well as value added products to nearly 135 countries in the world meeting 50.0% of the global demand. The share of seed spices export to total spices export is only 21.8% in terms of quantity and 7.4% in terms of value. Spices exports have registered substantial growth during the last five years, registering an annual average growth rate of 21.0% in value and 8.0% in volume. During the year 2014-15 spices and spice products export from India was 1490 cores, which has increased nearly 117% compared to what it was in 2010-11, whereas, seed spices export has gone nearly 268.0% high during the period. These figures show high demand of seed spices world over. In 2014-15 the export of seed spices from India was 241900 tonnes valued ₹ 2650.46 crores. (Vision, 2050).

There has been ever increasing demand of seed spices and importing countries look at India as consistent source. No other country in the world has such a broad supply base of seed spices. The climatic conditions prevailing in Rajasthan, Gujarat and some other adjoining states in the arid and semi-arid region are very much conducive for growth and development of wide range of seed spices.
One or the other seed spice is cultivated throughout India. But the prominent states where seed spices produced largely are Rajasthan and Gujarat, hence they are called as “Seed Spices Bowl”. Other states where seed spices commonly grown are Madhya Pradesh, Bihar, Uttar Pradesh, West Bengal, Orissa, Tamil Nadu, Punjab and Karnataka.

Among spices, Coriander (*Coriandrum sativum* L.) is one of the earliest spices and used by mankind. It is an annual herb belongs to umbelliferae family with 90 to 120 days growth period. Term coriander came from the Greek word, koris meaning bedbug because leaves and green fruit of this plant have an odour similar to bedbugs.

Coriander is cross-pollination crop. The seed type is dicot and having epigeal germination. It is extensively cultivated in arid and semi-arid region of India during *rabi* season. This spice is used by man as common flavouring substances. It is not only added flavour and taste to our food but also enhance keeping quality of food. The stem, leaves and seed have a pleasant aroma. Coriander seed have aromatic odour and taste due to an essential oil cilantro. The seed contains 16.2% fatty oil, 14.1% protein, 21.6% carbohydrate, 32.6% fiber, 11.2% moisture, 4.4% mineral matters and coriander leaves are very rich in vitamin A and vitamin C. Good quality oleoresin can be extracted from coriander seeds. The oleoresin is used for flavouring beverages, pickles, sweets, sausages and other delicacies, snacks etc. The residue from distillation can be used as a good cattle feed, as it is rich in protein and fat. Coriander leaves are being used in cooking, flavouring, beverages etc. and seeds are being used for preparing value added products such as coriander powder, dhana dal, curry powder, oleoresin and essential oil. It is known as low volume but high value crop of arid and semi-arid regions (Singh, 2014).

In India, area under coriander was 674000 ha with production of 883000 tonnes in 2016-17. Gujarat and Rajasthan both are major seed spice producing states of India. Gujarat occupies 121199 ha area with production of 189518 tonnes in 2016-17 (Anon., 2017b). Junagadh district rank first with growing area of 53530 ha with a production of 77619 tonnes and productivity of 1450 kg ha\(^{-1}\) during the year of 2016-17 (Anon., 2017a).
Irrigation requirement in coriander is depending upon the parameters such as climate, soil moisture level, and the variety used. Standard irrigation schedule is 5–6 irrigations in which first irrigation applied immediately after sowing and then 30–35, 60–70, 80–90, 100–105 and 110–150 days after sowing. Irrigation water improves water conditions in the soil, dissolves nutrients and makes them available to plants and increase coriander production.

Irrigation water is one of the scare and costliest natural resource for Saurashtra region and therefore, economic and efficient utilization become necessary. Precise information on water requirement by coriander is essential and inevitable. In Saurashtra, most of the districts which possess medium black calcareous soils are poor in water holding capacity. About 80-90% of the total irrigated area of this region is commanded by open wells and tube wells. Due to steep rise in demand for energy source, the cost of this scare input is limiting factor for crop production.

Recently, among the various approaches for scheduling of irrigation water for its precise application, climatological approach based on the ratio between irrigation water (IW) and cumulative pan evaporation (CPE) is found to be the most appropriate, as it helps in working out permissible interval between successive irrigation and stage of crop at which irrigation should be given, since annual fluctuation in weekly evaporation is varying considerably. Secondly, open pan evaporation values recorded at any particular place is considered to be more valid to large area.

Besides water management, use of organic manures also play an important role in improving the soil physical, chemical and biological properties that leads to increase the yield. Organic manure provides all the nutrients that are required by plants which increase crop yields, improve crop quality and minimize nutrient losses to the environment and farmer’s profit.

Farm yard manure (FYM) is the principle source of organic manure in our country which has been used since antiquity of the man. The organic carbon in the organic matter act as a source of energy for soil micro organisms and upon mineralization release essential elements during crop growth. In addition to supply of
available plant nutrients directly (Cooke, 1967), the use of FYM also mobilise the unavailable nutrients present in the soil.

Vermicompost as organic fertilizer has nitrogen, phosphorus, potassium, organic carbon, sulphur, hormones, vitamins, enzymes and antibiotics which help to improve the quality and quantity of the yield. It is observed that due to continuous misuse of chemical fertilizers, soil losses its fertility and degraded day by day. To overcome such problems, vermicompost application is the best solution.

Therefore, to bridge gaps in scientific knowledge as stated above and to find out most suitable irrigation schedule based on IW/CPE ratio and organic manure application for coriander, the present investigation entitled “Response of coriander (Coriandrum sativum L.) to irrigation schedule based on IW/CPE ratios and organic manures” was proposed with the following broad objectives.

Objectives:

I. To ascertain optimum IW/CPE ratio for scheduling irrigation to coriander under South Saurashtra condition.

II. To study the effect of organic manures on coriander.

III. To work out the consumptive use of water and water use efficiency by coriander.

IV. To study the interaction effect of irrigation and organic manures on growth and yield of coriander crop.

V. To arrive at an economically viable conclusion.