



**ORIGINAL ARTICLE**

**Studies on Coriander Mottle Virus Incited Histological Changes in Stem of  
*Coriandrum sativum* Linn.**

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**ABSTRACT**

*Coriander, Coriandrum sativum, is an erect annual herb in the family Apiaceae. The leaves of the plant are variable in shape, broadly lobed at the base of the plant, and slender and feathery higher on the flowering stems. It is a soft, hairless plant. The flowers are produced in small umbels and are white or very pale pink in color with the petals pointing away from the centre of the umbel longer than those pointing towards it. The plant produces an oval shaped fruit which is yellow-brown in color and contains two seeds. Coriander is an annual plant, surviving only one growing season and reaches up to 50 cm (19.7 in). Coriander may also be referred to as Coriander, Chinese parsley or dhanian and originates from the Near East. All parts of the coriander plant are edible, but the fresh leaves and the dried seeds are most commonly used. Leaves and seeds are used fresh or dried as a herb in cooking.*

**Key words:** Coriander Mottle Virus, Histology, *Coriandrum sativum*

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**INTRODUCTION**

Herbs and leafy green "salad" crops are a good source of various minerals, vitamins, antioxidants and other medicinal compounds. They are very important for the distinct flavor, aroma, and appearance of the local cuisine, each country or region having its own preferred herb or group of herbs and leafy salads. These are usually high value crops, which can be grown throughout the year in large, medium, or small scale production units. These crops can be grown with low inputs or with high technology, depending on the resources available to growers, and may contribute significantly to the farmer's income. High value markets such as the organic, natural, and export markets may be especially profitable. Herbs such as Coriander (leaf coriander) (*Coriandrum sativum*) and broadleaf Coriander (fitweed, spirit weed, shado benee; *Eryngium foetidum*) are essential for the preparation of many plates in several regions in Asia, Africa, Oceania, Europe, and America.

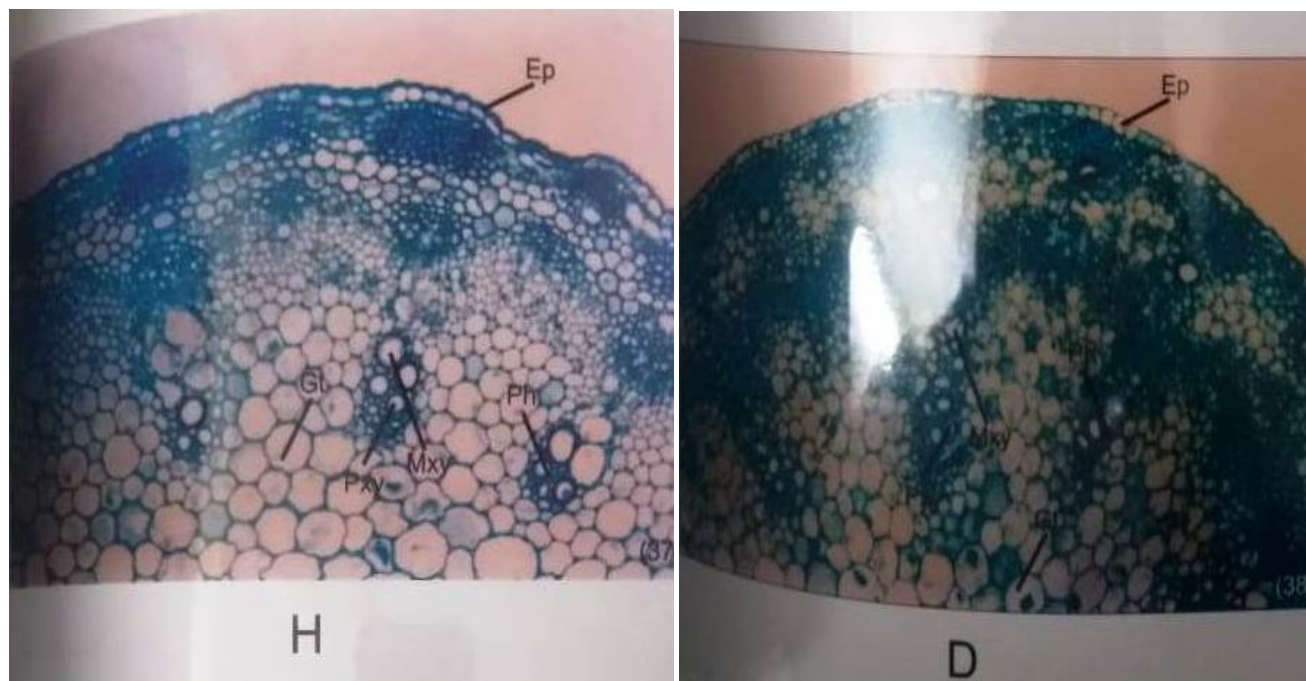
Coriander mottle virus a newly described virus that causes a foliar and root disease in plants which seriously diminishes yield and quality. It infects crops in most commercial coriander producing areas of world. Infection sometimes reaches very high incidences within individual crops resulting in their being abandoned due to unmarketability.

The Roman Empire is largely responsible for the spread of Coriander, for it brought and grew the plant to its provinces, and from there the crop further spread as merchants brought seeds beyond the Roman frontiers. Hence, Coriander was grown in England as far back as the 1st century A.D. (introduced by the Romans), and was known as a vegetable in China in the 5th century A.D. (introduced through Persia). The crop was brought to

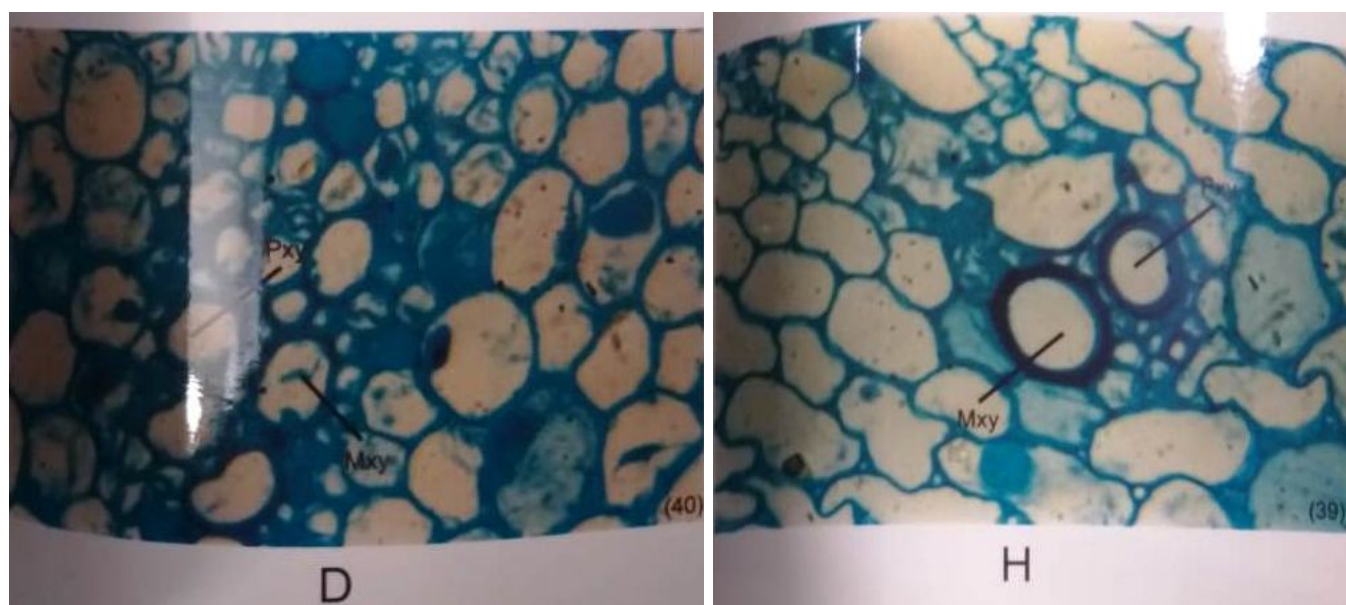
Hispaniola (currently the Dominican Republic and Haiti) by Spanish conquerors late in the 15th century, and then to other European colonies in the American continent, Australia and the Philippines.



**Fig 1:** Healthy and diseased plants in field condition, **Fig. 2:** Healthy and diseased plants showing differences in stem



**Fig. 3:** Low power (150X) microphotograph showing healthy and diseased stem of Coriander



**Fig. 4:** High power (400X) microphotograph showing healthy and diseased stem of Coriander with changes in xylem

Several diseases afflict Coriander, among them the bacterial spot and wilt caused by *Pseudomonas syringae*, the powdery mildew caused by the fungus *Erysiphe*, the leaf spots caused by the fungi *Cercospora* and *Alternaria*, and the root rot and white mold caused by the fungus *Rhizoctonia*. Incidence and severity of diseases vary depending on the environmental conditions of the region, the Coriander variety grown, and the prevalence of pathogen propagules. High temperature and humidity favor the development and spread of these diseases.

**MATERIALS AND METHODS**

Coriander fields were surveyed in Rabi season in Kakua area of Agra region. Plants showing characteristic mottle virus infection symptoms were collected and the virus was maintained on test plants grown in earthen pots containing soil and compost in the ratio of 3:1. Plants of the same height and age were selected for experimental work. These were kept in insect proof cages. Further to avoid any possibility of insect infection, Folidol E-605 was also sprayed periodically. The preserved plant material were dehydrated, embedded and make sections, properly stained to take microphotographs for histological study as per standard procedure and protocols.

**RESULTS AND DISCUSSION**

In the present study, instead of external changes marked changes were observed in histological section study. Stem becomes yellow and slimy externally. In sections there is destruction of cells and margins of pericycle has been observed. Endodermis tissues are also damaged. Xylem has been shrunked significantly with alteration in phloem tissue.

Coriander (*Coriandrum sativum* L.) belongs to the family of Apiaceae, formerly named Umbelliferae. It is an annual, fast-growing, short herbaceous plant, propagated by seeds, which usually come in pairs inside the round, small (<5 mm), and dry fruit commonly called coriander. The root system is delicate and not very profuse. The stem is erect and branching, commonly reaching less than 75 cm in height. The leaves are flat, small, indented, commonly green, but purple in some varieties.

Coriander is an important spice crop belonging to the family Apiaceae. It's all the tender aerial parts, stem, leaf, flower, fruits are used due to aromatic flavour. The crop is grown in almost all the states of the country but Rajasthan, Madhya Pradesh, Andhra Pradesh, Tamil Nadu, Orissa, Uttar Pradesh and Uttarakhand are the major coriander growing states. Rajasthan produces quality coriander and enjoys major share in area and production in the country. Coriander is also grown in Morocco, Russia, Bulgaria, Mexico, Argentina, China, Romania, Japan and Italy. From India coriander seeds and its powder are exported to several countries like Malaysia, Singapore, Srilanka, USA and gulf countries. During 2010-11, 4.82 lakh tones of coriander seeds were produced from 5.30 lakh area (Malhotra and Vashistha, 2008; Champawat and Singh, 2008; Anonymous, 2013). Coriander contains 24 g carbohydrates, 1.3 g protein, 19.6 g fat, 5.3 g minerals and 6.3 g moisture in 100 g seed. Other compounds are linalool, a and b pinene, para cymene, a- terpenene. The oil from foliage contains aliphatic aldehydes, mainly dacylaldehyde. The seeds have 0.4 per cent essential oil. It is more in European coriander. Linalool is the main component up to 90% and up to 7% thymol. Oleresins with 90% fatty oil and 5% steam volatile oil is also obtained from seeds. These enhance aroma and flavor. Coriander seeds are used as medicine to cure indigestion, dysentery, vomiting as well as cold. The essential oil has carminative, antiseptic, bactericidal, fungicidal and muscle relaxant. The coriander plant parts and seeds are used by people as short-cut medicines for various body problems (Singh *et al.*, 2007).

According to Pandey (2010) coriander is an important source of chemicals like alpha pinene, gamma terpenene, lononene, cymene, various nonlinalool alcohols, esters, flavonoids, cumarines, isocumarines, phthalides and phenolic acids. Coriander oil contains coriandrol, girenol and vebriniol.

The crop suffers due to a number of biotic and abiotic stresses which are detrimental to plant health and seed quality. Several disease causing pathogens are seedborne. They are associated with seeds externally, internally, extraembryal, intraembryal, as contaminant and inert matter as well as associated with inert matter. Their seed to plant transmission may be local or systemic or both. It is essential to know the actual location of the pathogen with seeds for its management. Plant to seed infection and its time of infection is a must to plan measures to check it to get pathogen free seed as produce.

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