CHAPTER - 2

Review of Literature
In India Considerable work on carrot has been done by many worker in many countries special nutrition may be made of the work of Mukhopadhyay (1969), Narain (1978), Prabhu (1965), Shukla, Singh and Bhargava (1978) and Srivastava (1979).

According to Mackevic (1929), Afghanistan is the primary centre of carrot. Carrots probably were first grown in America in the Salem gardens about A.D. 1620 (Shoemaker, 1947). Seed stalk formation results only when these plants are subjected to a subsequent temperature at 12.2-21.1°C. Plant grown continuously at a temperature at 21.1-26.7°C fail to develop flower primordial (Sakr and Thompson 1942). The cultivated carrot (Daucus carota sp. sativus) has wild relatives belonging to the same species, among which the wild carrot D. carota sp. carota is commonly found, for instance, along road verges in temperate regions (Brandenburg 1981; Holm et al. 1997), including Denmark (Hansen 1981). It is a common and sometimes serious weed (Mitich 1996; Holm et al. 1997), in particular in no-tillage crop production systems (Stachler and Kells 1997). Cultivated and wild carrots are known to hybridize spontaneously, and wild carrots may therefore contaminate seed crops of cultivated carrots via its pollen (D’Antuono 1985; Hauser and Bjørn 2001), which is a major cause of genetic deterioration of seed stocks (D, Antuono 1985; Wijnheijmer et al. 1989). Also, there are strong indications that reciprocal hybridization and introgression from cultivated to wild carrot take place in nature (Wijnheijmer et al. 1989; Hauser and Bjørn 2001; Magnussen and Hauser 2007), and that hybrids are able to survive in natural habitats of wild carrots (Hauser and Shim 2007). Increased and more continuous exposure of the resistance trait in wild populations, in addition to in the crop, may enhance the likelihood of resistance evolution in the pest, and deteriorate the possible role of wild relatives as resistance refuges to slow down resistance evolution (Conner et al. 2003; Andow and Zwahlen 2006). According to Burkill (1935), beet root was introduced into India in remote times, but whilst the plains
of the Ganges suited it, did not spread to further east. It was taken by sea by the Arabs to China. The beet has an extensive root system, the may penetrate the soil to a depth of 10 ft (Weaver and Bruner, 1927). They are also rich in iron and vitamins (Iron 3.1 mg, Vitamin A. 21000 IU, Thiamine 10mg and ascorbic acid 50mg per 100mg edible portion) (Nutrition chart, Heinz Co, 1942). According to Anderson (1952) beet was certainly domesticated first as a leafy vegetable, then as a root crop and finally as a source of sugar. The methodical use of sugar beets for the extraction of sugar dates to 1747, when Andreas Sigismund Marggraf, professor of physics in the Academy of Science of Berlin, discovered the existence of a sugar in beets similar in its properties to that obtained from sugarcane. The discovery was little used at first, however, and the manufacture of sugar from beets did not attain commercial importance for over half a century. Marggraf’s student and successor Franz Karl Achard began selectively breeding sugar beet from the ‘White Silesian’ fodder beet in 1784. By the beginning of the 19th century, his beet was approximately 5–6% sucrose by (dry) weight, compared to around 20% in modern varieties. Under the patronage of Frederick William III of Prussia, he opened the world’s first beet sugar factory in 1801, at Cunern in Silesia. The beet sugar industry in Europe rapidly developed after the Napoleonic Wars. By 1812, Frenchman Jean-Baptiste Quéruel, working for the industrialist Benjamin Delessert, devised a process of sugar extraction suitable for industrial application. By 1837, France was the largest sugar beet producer in the world, a position it continued to hold in the world in 2010. Arthur Stayner (1899) is regarded as the "father and founder of the movement that made the manufacture of sugar in Utah a success".

Inscriptions on the inner walls of pyramids show that radish was an important vegetable in Egypt about 2000 B.C. Certain remarks of Herodotus reveal that it was cultivated about 2700 B.C. (Becker, 1962). It has spread to China about 500 B.C. and to Japan A.D. 700 (Sirks, 1957). According to Purewal (1957) it is cooling in effect, prevents constipation, increases appetite and is very useful when both roots and leaves are cooked together. The most common radish is oval with a dark red skin and white flesh (Thompson and Kelly, 1957; Maynard and Hochmuth, 1997). Size varies depending on market demand, but larger roots are more likely to be pithy (Carione and

Isolation of fungi have also been done by de Bary (1886) and Pandey et al (2003) it was identified as Sclerotinia sclerotiorum (Lib) de Bary According to Neeragard (1977), a disease is borne in the seed, in the sense that potentially it is brought forth or given support by the seed. The study of fungus nutrition by the use of media of known composition and concentration and concentration started with the work of Raulin (1869) with Aspergillus niger. Lilly and Barnett (1951) found that all media were not equally suited for a particular fungus. Sherwood (1923), who worked with Alternaria radicina observed that it could grow for pH 2.2 to 8.4 but failed to germinate at pH 1.8. Horne and Miller (1927) reported that the optimum growth of the three strains of Alternaria was at the neutral point. Wolf and Wolf (1947) remarked diversity in ability to use carbohydrates is indicated by numerous reports. Robbins (1934) and Steinberg (1950) have classified fungi according to their ability to utilize different sources of nitrogen. Wolf & Wolf (1944) have suggested that fungi selected amino acids first because they can utilize it in the synthesis of protein with the least need for energy. According to Foster (1949) the nitrogen content of the mycelium lies in between 3 to 6% or higher and varies with the species, age, nutrition and other factors. The nitrogen content of mycelium of Alternaria species was found to vary with the nitrogen nutrition, being low on nitrate and high on ammonium nitrogen (Srinivasapal, 1953). The discovery of Wildfires (1901) on growth promoting substance which he named as “Bios” marked the beginning of studies on the effect of necessary growth substances on fungi.

Foster (1949) has reported that nitrogen content of mycelium generally lies between 3 to 6 percent which varies with the species age, nutrition and other factors. During the last two decades many workers including Wolf, (1953,1955) Wolf et al., (1950) Lopatecki and Newton (1956), Taber and Vining (1957), Mira and Mahmood (1960) as well as Saksena and Kumar (1961) Tandon and Bilgrami (1954 and 1957), Bilgrami and Verma (1978), Jenning and Austin (1973), Bhargava (1970) and Hosija & Chowdhury (1980) have obtained diverse results about the utilization of different nitrogen compounds by the fungi investigated by then. These isolates were in agreement with those described
for both *A. brassicicola* and *A. brassicae* by Ellisv (1971) and Simmons (1995, 2007). Although long conidial chains observed in all *A. brassicicola* isolates are also a characteristic of *A. alternata*, a fungus that colonizes decaying leaf tissue of many plant species (Ellis, 1971), The *Alternaria brassicae* and *A. brassicicola* are causal fungi for Alternaria blight of radish is supported by Mondal *et. al.* (1989) and *Alternaria alternata* is corroborated with Suhag *et al.*, (1985). Maximum fungal growth was observed in the centre of the spot. The leaf spot was turned into blight at severe infection. Initial infection was started from soil level on older leaves and gradually increased upward including petiole, flower stalk, pod, green and matured seed are agreement with the Kubota *et al.* (2003) and King (1994). Both sulphur and phosphorus plays vital role in the nutrition of fungi. This has been reported by several workers including Armstrong (1921), Volkonsky (1933,1934), Senate (1940), Ateinberg (1941), Mann (1944), Bhargava (1945), Saksena *et al.*, (1952) Agarwal (1957, 1958), Tandon (1963). The important role of Suphur compounds with special reference to their role in biological methylation by fungi has been reviewed by Challenger (1953). Pure chemical were used on the basis of previous investigation (Tandon and Bhargava, 1962) and the pH of various media was adjusted to 5.5 Twenty-five ml of the medium was poured in 150 ml Erlenmeyer Pyrex flasks and these were autoclave at 15 psi for 15 minutes.

On the basis of the morphological characters of the fungus and their analogy with that given by Rao (1964) and Farrar *et al* (2004) it was identified as *Alternaria dauci* (Kuhn) Groves and SkolkoThe disease has been reported on carrot in India by Pandey *et al* (2003).Morphological effects of temperature were observed on the conidia of *Cercospora sesame* (Chowdhury (1944) and on conidial fructification of Aspergillums Janus (Raper and Thom. 1944). On the basis of the morphological characters of the fungal pathogens associated with the diseases these were identified as *Sclerotinia sclerotiorum* (Lib) de Bary causing root rot and *Alternaria dauci* (Kuhn) Groves and Skolko causing inflorescence blight. Both the diseases are reported for the first time from the dry temperate zone of Himachal Pradesh (Narendra K Bharat *et al.* 2012). A leaf blight of carrot (*Daucus carota*) caused by *Alternaria dauci* was found in Alentejo (Ourique, Portugal). Morphological characteristics of the fungus are described (Maria Cristina Lopes and Victor C. Martins 2008).
According to Howker (1950) the optimum temperature for growth of fungi is usually between 20°C to 32°C and the cardinal points (minimum, optimum and maximum temperatures) for vegetative growth of the fungi are usually 0°C, 5°C, 20°C – 30°C and 30°C usually fungi do not grow below 0°C or above 40°C but exceptions are not infrequent. Panasonrko (1967) stated As a rule fungi are more tolerance to lower than to higher temperatures since the latter coagulate cell proteins. Tandon (1960) found that maximum and minimum temperatures for the growth of Diplodia notatiss were 38.8°C and 13.3°C respectively and optimum being 30°C. Bennet (1921) observed the mycelial of Phoma apicola between 5°C and 28°C while Pycnidial development took place between 13.0°C and 26°C. Ames (1915) reported that the range for growth of Monilia fructigna and Cephalothecium roseum were 4°C – 30°C and 9°C – 35°C respectively while the corresponding ones for the production of conidia were 9°C – 30°C and 14°C – 30°C. Massey (1926) observed that Fusarium oxysporum on Gladiali cold grow over range of 5°C -32°C with optimum temperature at 27.5°C. Agarwal (1955) reported that Fusarium coeruleum cold not speculate at 8°C but the sporulation was best at 20°C – 24°C and decreased at higher temperatures. Bhargava (1962) obtained best growth and sporulation of Fusarium solani at 25°C. According to Joffe and Palti (1972) in cultures isolates of Fusarium solani grew best at 24°C – 32°C. Seeds rich in protein and starch have higher moisture contents which results increase in respiration, water content and temperature of seeds causing loss of germination capacity, seed moisture encourages fungal growth (Hummel et al. 1954). In the range of moisture content between 14.0% and 15.0% in soybeans or between 10.5% to 11.5% in flax seed, a difference of only 2% of moisture content makes a great difference in the rate of growth of storage fungi as mentioned by Christensen and Kaufmann (1968).

According to Lilly and Barnett (1951) “There is no universal fungicide. Therefore, it became necessary to test the efficiency of some chemotherapeutants on the organisms under study. The word fungicide has originated from two Latin words viz. fungus and caedo. The words caedo means “To kill”. Thus a fungicide would be any agency which has the ability to kill the fungus. Many workers including Valaskova (1962), Sen. Gupta and Roy (1971), Well (1972), Byrde(1977) and others have tested a number of fungicide and made outstanding contributions in this field. A seed-borne

In India the disease has been reported to infect leaflets, petioles and seed stalks (Rao 1964, Gowda et al 2000, Gupta and Thind 2006) but its occurrence on the inflorescence of carrot seed crop plant in dry temperate zone is reported for the first time. Strandberg (1983) has also reported the infection of carrot inflorescence by *A dauci*. There is considerable literature available on the breeding and inheritance of disease resistance in plants. The promise of resistance to pests and diseases has attracted the attention of plant breeders ever since the demonstration near the turn of the century that resistance could be selected and that it is often simply inherited. The built in protective resistance effective throughout a crop plant’s life offers a compelling alternative to fungicides and insecticides. In the early years, minimizing the use of protective chemicals was desirable because it saved money but today there is an added advantage of reducing their hazard against those pests and diseases such as cereal rusts, soil-borne smuts and certain nematode diseases. There is considerable literature available on the breeding and inheritance of diseases resistance in plants. Hansen (1934) had given a list of papers published on the inheritance of disease resistance in plants up to 1934. The literature on the genetics of diseases resistance in vegetables has been reviewed by Walker (1965, 1969) and on field crops by Ausemus (1943) and Dickson (1956), Dvorak(2001). Inheritance of resistance to viral diseases has been reviewed by Holmes (1954), resistance to rusts by Hooker (1967) and to nematodes by Hare (1965). Some more review articles are those of Hooker and Saxena (1971), Roane (1972) on trends in breeding for disease resistance in crops, Hooker (1974) on cytoplasmic susceptibility in plant disease and Sadasivan (1975). Alien geranplasm as a source of resistance to disease has been discussed by Knott and Dvorak (1976). An interesting article is by Browning et al., (1977) on managing host genes epidemiological and genetic concepts. The genetics

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The resistance to plant viruses has been reviewed by Fraser (1990). Multiple disease resistance in grain legumes has been discussed by Nene (1988). Molecular genetics of plant disease resistance has been recently discussed by Staskawicz et al. (1995). The use of disease resistance varieties for controlling plant diseases has been termed as the painless method because it does not cost the farmers anything's. The resistance defends itself against a potential pathogen by means of number of physical and chemical characteristics of the plant or which are formed in the plant in response to infection. The physical characteristics act as mechanical barriers which prevent the trances and spread of pathogen in plant chemical factors which are toxic to the pathogen inhibit its growth and activity in the plant. Since Biffen’s (1905) elucidation of the inheritance of the resistance in single Mendelian fashion, spectacular progress has been made in our understanding of the genetic aspects of parasitism and disease resistance. The mechanisms of variability that make the pathogens versatile in their behavior and host range are now well known. Flor (1955) explained host parasite interaction in flax rust by assuming gene for generation ship between rust reaction in the host and pathogenicity in the parasite.

Link and Walker (1933) reported presence of protocatecuie acid and catchall in dry pigmented scales of onion bulbs resistance to Colletotrichum circinans. Flor (1955) reported that resistance varieties of flax execrate hydrocyanic acid (HCN) in the rhizosphere. Orton (1990) obtained resistance cotton varieties from selection and multiplication of resistance individually. He observed that some cotton plants did not show wilting in the heavily infected crop. A vast majority of crop varieties can be attack by a single pathogen or many different kinds of pathogen can attack a single variety. Most plant are naturally resistance to many pathogen. During evaluation of plant life weak and disease susceptible individuals have been progressively eliminated by nature and the plant which exist today are those having developed resistance to most pathogens in a particular geographic area.