



**Fig. 1.** Disease symptoms in field (source: Dr. N. Greco), 2. Infected (left) & healthy carrots (source: <http://www.inra.fr/hyppz/IMAGES/7031891.jpg>), 3. Potential distribution (blue dots) in Australia following entry.

**Disease:** Carrot cyst nematode disease

**Common name:** Carrot cyst nematode, eelworm

**Classification:** P: Nematoda Tylenchida, C: Secernentea, O: Tylenchida, F: Heteroderidae, G: *Heterodera*

The carrot cyst nematode (CaCN) is an important pathogen of carrots. Like potato cyst nematode (PCN), the cysts of this nematode can survive many years in the field without a host. This sedentary endoparasitic plant nematode can cause a reduction in quality of the crop to complete crop loss. If introduced, it would be a major threat for the Australian carrot industry.

### Host Range:

Compared to other cyst nematodes, CaCN has a very limited host range. The nematode is mainly restricted to cultivated and wild carrots (Jones 1950) and other *Daucus* spp. within the Apiaceae. However, other plants, such as *Torilis arvensis*, may act as a reservoir for the cyst survival (Vallotton 1980).

### Disease Symptoms and Life Cycle:

Typically, the disease symptoms appear as signs of nutrient deficiency. The symptoms in the field are characterised by stunted growth and yellowish foliage (Fig. 1). Compared to healthy carrots, the diseased carrots are small with numerous beard-like rootlets (Fig. 2) and become unmarketable. The life cycle initiates with the emergence of the second stage juveniles (J2) from the eggs. Juveniles move through the soil and parasitise the fine roots.

### World Distribution:

CaCN has a limited distribution and it is generally found throughout the United Kingdom and Europe

in carrot growing regions. Outside Europe, CaCN has also been reported from Cyprus, India, and only Michigan state in the USA (Berney 1992).

### Potential Spread in Australia and Impact:

CaCN is not currently present in Australia. However, international trade, tourism, favourable climatic conditions, and availability of the carrot host enhance the chance of entry, spread and establishment of this parasite in several areas of Australia (Fig. 3). Exotic CaCN is identified as one of the top threats to the Australian carrot industry because it has been reported to cause crop loss of up to 80% in the USA and some European countries.

### Management and Control:

No effective chemical or biological control methods are currently available. Rotation with non-host crops has had some success in managing the disease, but the cyst's long term survival capacity without a host makes this difficult.

### Further Reading:

Jones FGW (1950). *Nature* **165**, 81.

Vallotton R (1980). *Le maraicher* **43**, 258-261.

Berney MF, Bird GW (1992). *Journal of Nematology* **24**, 776-778.

**Key Contact:** Abu-Baker M. Siddique, Department of Agriculture & Food, WA Ph: 08 9368-3261