Hybridization

Hybridization of carrot

Carrot is a cross-pollinating crop. And because the stamen ripens earlier then the style selfpollination can be prevented. But inbreeding is possible. Carrot hybrids descent from two or three parents, so-called 2-way and 3-way hybrids. The motherline is paternally sterile. This sterility is a result of a chance in the cytoplasm. This cytoplasmatic sterility (CMS) is a natural characteristic in carrot. Pictures 1 and 2 show respectively a sterile plant and a fertile plant.
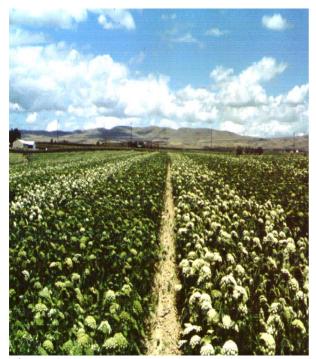

Picture 1

Picture 2

Plants descended from the motherline are all sterile and to be able to maintain this line a fertile maintenance-plant is used. The seed harvested from the sterile motherline after crossing it with the maintenance-plant, will be sterile again because of the genetic pool of the maintenance-plant.

Dependent on the paternal material a range of selection-systems can be followed. Inbreeding, backcrossing and line-selection are examples. Carrot is a crop which, dependent on the genetic background, suffers from inbreeding-depression. Development of parental-lines therefore does not follow a fixed schedule. It is hard to say how many generations of inbreeding are needed to come to suitable parental-lines and when strifing to parental lines with a low degree of inbreeding-depression.

Picture 3

Picture 4

The hybrid seed is often produced in countries abroad like France and the USA. Parental-lines are sowed in fall to make vernalization in the next winter, possible. In the summer following sowing the crop blooms and seed is produced. The paternal-line is destroyed after pollination to prevent mixing paternalseed and hybridseed. The percentage of paternal-line in the field determined the success of the seedcultivation, because the stamen are needed to produce hybridseed. But if the percentage of parental-line is too little, too little hybridseed is produced as well. The used ratio is 4 maternal-lines per 2 paternal-lines. Pollination is done by bees from hives around the productionplots. Picture 3 shows a flowering productionfield and picture 4 ripened seed.