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Taifun Soy Info

Specialist information for soybean producers and processors

Taifun Zentrum für Sojaanbau

Soybean mosaic virus

Soybean mosaic virus is a globally distributed virus that can cause yield loss, reduced seed quality, and reduced nodulation in soybeans. The symptoms on infested plants range from no visible symptoms to severely deformed plants and spotted seeds. The most effective measure to avoid infestation is the use of seeds that are as virus-free as possible. In addition to infected seeds, aphids can be a vector of the virus. In Germany, however, aphids have not played a role in soybean cultivation so far and hence can be neglected as vectors.

Pathogen

Soybean mosaic virus is a curved, rod-shaped single-stranded (+) RNA virus, which is between 650 and 760 nm long. Several strains have been identified on the basis of their response on certain varieties. In the USA there are nine different strains, which have been named G1 to G7 as well as G7a and C14 (Laboratory for Soybean Disease Research, 2016). Probably there is a number of other, not yet identified strains, e.g., in China or Japan. The virus is mainly transmitted by aphids or infected seeds. In addition to soybean, there are other host plants, e.g., white goosefoot (*Chenopodium album*), white lupin (*Lupinus albus*), pea (*Pisum sativum)* or field bean (*Vicia faba*) (AGES, 2016).

Symptoms

Infected plants are retarded in their entire development and often show symptoms on the leaves. The leaves are crimped along the leaf veins and bent downwards (Fig. 1). On single leaves there are peculiar light and darker spots (Michigan State University, 2016). Here mainly young, fast growing leaves are affected.

Heavily infected plants produce fewer pods or pods without seeds. The grains also show characteristic spotted patterns (Fig. 2). However, these spots are not necessarily proof of a virus infestation, but can also be caused or intensified by other stress situations (e.g. temperatures during flowering (Ross, 1970) or the time of infection (Tu, 1992). The symptoms can vary depending on the variety, virus strain, time of infection, environment and age of the stand (AGES 2016). In some cases, reduced nodulation and lower dry mass of the nodules on infested plants can be observed (Dhingra and Chenulu, 1980). In experiments, a reduced amount of nitrogen was found in the soil after the plants have been infected by the virus (Gupta and Joshi, 1976).

Control

The best preventive measure is the use of seeds that are as virus-free as possible to preempt a possible source of infection before sowing. There are no limit values for soybean mosaic virus in seeds. In the USA, 0.1 % infected seeds are recommended, but in locations with high aphid density as potential vectors, only 0.01 % should be used (plantwise.org, 2016).

Since infestation of young plants causes the greatest damage, sowing under optimal conditions is favorable to promote rapid development.

The use of insecticides against aphids is viewed very critically in the USA. Specific agents usually don't operate fast enough to prevent transmission and more effective broadband agents often have a negative effect on beneficial organisms.

Not all soy varieties are equally susceptible to the virus, and resistance genes have already been found (Laboratory for Soybean Disease Research, 2016). Yet, due to the ever-changing virus, breeding for resistant genotypes remains a continuous process.

A very detailed description of the virus with numerous references can be found here: http://www.plantwise.org/KnowledgeBank/Datasheet.aspx?dsid=48750

Figure 1: Leaf symptoms of infestation with soybean mosaic virus (North Carolina State University, 2005).

Figure 2: Symptoms on infected seeds (Taifun, 2015).

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