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# SUNFLOWER RESISTANCE TO SCLEROTINOSIS AND METHODS TO RAISE IT

In the forest-steppe zone of the Ukraine sunflower sclerotinosis or storage rust (excitant is Sclerotinia sclerotinorum (Lib. de Bary) appears on sprouts, stalks and ripening heads, causing the spareness of seedlings, reduced harvests and worse sowing and economic qualities of seeds.

The study of the resistance of world sunflower collections to sclerotinosis have shown that cultivated sunflower has almost no immunity to that fungus.

Yet we are confident that selection to attain resistance to sclerotinosis will be ultimately successful owing to G.V. Pustovoit's having found sources of resistance to that disease among wild species of Helianthus of the North American origin (G.V. Pustovoit, 1968). Of considerable importance in this effort are good infection backgrounds and methods of artificial inoculation. Our experiments have established that sunflower is resistant to an unequal degree in different periods of its life and this necessitates evaluation of resistance to sclerotinosis during the whole period of sunflower vegetation against the artificial infection background.

To assess sunflower resistance to sclerotinosis in the phase of sprouts and also in the root form of that disease two or three most virulent sclerotia of the causative agent weighing one or two grams each are introduced into nests together with the seeds sown.

The sclerotia's virulence depends on conditions of their formation and on the period and conditions of their storage since picking.

The most virulent are the sclerotia formed in moist years and kept for up to four years. The virulence diminishes with the growth of the period of keeping. Negative temperatures affecting sclerotia during winter decrease their virulence and their ability to grow in apothecia. Sclerotia

can be kept in soil in a box in the depth of three or five centimetres,

In years of insufficient moistening mycelium can be used as inoculum under artificial infecting in order to assess the plants' resistance to the root form of sclerotinosis. Grown on sunflower stalks infected in natural conditions, micelium coupled with pieces of stalk tissue is tightly placed against the root neck, without damaging the tissues, and is covered by slightly moistened soil.

Heads are infected just before blooming, to avoid repollination of invected forms, and during yellow ripenness, with micelium of the causative agent being used as the inoculume. Having been obtained from stalks or heads infected in natural conditions, the micelium is introduced with pincers under the covering leaf of the involucre, so as not to damage it.

In our experiments the virulence of the micelium grown on sunflower tissues has been considerably higher than the virulence of micelium grown on oats seeds in laboratory conditions by the methods worked out earlier (I.V. Grechka, 1965).

Such micelium can be obtained from sunflower stalks or heads invected in the field but not yet wilted.

The portion of the stalk or head invected by sclerotinosis is separated from the healthy portion, thoroughly washed with water, divided into two parts and placed into a wet camera which is formed by an excicator, glass vessel or jars. The vessels are covered with filtre paper from above and from the sides. In 12-14 hours the infected pieces are abundantly coated by the white micelium of the excitant.

Pieces of that micelium are used for inoculation together with the sunflower's crushed tissue. Since tissues are not damaged under artificial infection by the sclerotinosis' causative agent this reduces the infection load on the plant, while the employment of the micelium be-

longing to the fungus' natural populations makes inoculation akin to infecting under natural conditions. Sclerotia are taken from different areas of sunflower cultivation, bearing in mind the availability of the biological forms of sclerotinosis stimulant.

To combat the seed infection by sclerotinosis and to protect the seeds and sprouts from soil pests and microorganisms so that sunflower seeds should appear all at once and on time, we have studied the influence of seed treatment by the fungicides TWTL (tetramethylthiuram-disulphate), phenthiuram (40% of the TMTD, 10% of the TMTD, 10% of copper trichlorphenolate, 15% of the gamma-isomer hexachlorancyclohexane), vitavax (2.3-dihydro-5-carbocalanimide-6-methyl-1.4 oxatene), benomile (50% of methyl-1-(butilcarbamyl)-2-bensimidazole carbamate).

The highest effect was obtained from treating sunflower seeds beforehand (2 to 2.5 months before sowing) to phenthiuram (3 kg per a ton of seeds) and vitavax (2 kg per a ton of seeds).

To increase the effectivity the preparations were enriched by the microelements manganese or zink in the form of sulphates ($MnSO_4 \cdot 5H_2O \cdot 7H_2O$) per 0.5 ton of seeds. Field germination was increased by 10-25%, sclerotinosis incidence was reduced two- or three-fold and the crop yield was increased by 1.5-3.0 centners per hectare.

In production experiments conducted during three years, sunflower seeds were treated to phentiuram enriched by microelements on the area of 300 hectares, and this resulted in the crop increase by 3.6 centners per hectare and the economic efficacy of 50.4 roubles per hectare.

In the forest-steppe zone of the Ukraine sunflower ripening and harvesting often lengthens owing to unfavourable weather, and heads are in that period massively infected by sclerotinosis. To shorten the period of ripening and reduce the

heads infecting sunflower was desiccated with magnium chlorate ($Mg(ClO_3)_2 \cdot 6H_2O$), when desiccation attended artificial inoculation the heads infection with sclerotinosis diminished 6.5 times.