A COMPARISON OF GREENHOUSE AND FIELD INOCULATION OF LADINO CLOVER WITH Sclerotinia trifoliorum

IN A recent paper, Hanson et al., describe greenhouse inoculation techniques used to isolate Ladino clover plants resistant to Sclerotinia trifoliorum Erikss. In these greenhouse studies, seedlings and cuttings were grown in flats and inoculated with liberal quantities of dried grain inoculum, when the plants had developed four or five fully expanded leaves. The inoculated plants were placed in a moist chamber maintained at 15 to 20° C. and readings were taken over a 7 to 14 day period. Significant differences in survival were found among strains and clones. The inoculation of seedling progenies from crosses among clones arbitrarily classified as “resistant” and “susceptible” on the basis of survival among vegetative progenies, showed that certain plants were capable of transmitting a reasonably high degree of resistance to their progenies.

A selected group of single cross progenies evaluated in the greenhouse were planted in the field, and inoculated with S. trifoliorum, (a) to determine whether or not the level of resistance established in greenhouse tests would be of economic significance under field conditions, and (b) to compare greenhouse and field response. The greenhouse ratings (percentage of healthy survivors) for the progenies included in the field experiment were as follows: 24 resistant × resistant progenies, 24.3%; 22 resistant × susceptible progenies, 15.3%; and 29 susceptible × susceptible progenies, 11.0%.

The 75 single cross progenies were planted in 5 by 10 foot plots in a complete block experiment with 4 replications. Each replication contained five plots of a commercial Ladino clover check. The seed was scarified, planted in vermiculite and subsequently transplanted to flats. Each flat containing 50 seedlings, corresponded to one field plot. The plants were set out in the late spring of 1952 on 1-foot centers within plots. Estimates of percentage ground cover were taken on individual plots on Nov. 22, 1952. The first, third and fourth replicates were inoculated with a broadcast application of dried grain inoculum on Dec. 15, 1952. The inoculum was applied at the rate of 1 g. per square foot. Ground cover estimates were repeated 1953, and observations continued through the summer.

A measure of winter killing was obtained by ground cover estimates taken in the uninoculated portion. The percentage ground cover was 70.2% in November and 60.1% in April, giving a survival rate of 63.7%.

The correlation coefficient for fall and spring ground cover estimates in the second replication was high (r = 0.85).

There were no significant differences among field ground cover estimates in the three inoculations. Although greenhouse inoculations were effective in isolating Ladino clover plants resistant to S. trifoliorum, the effectiveness of artificial inoculation was demonstrated, however, by an average survival of 21.5%. An analysis of variance of the inoculated series showed that survival in 42 of the single crosses was significantly higher than the commercial check. Survival differences for 31 of these comparisons were significant. None of the single cross progenies had a significantly lower survival than commercial. The percentages for one of the better clones were 22.5%, 42.7, 48.7, and 57.3 when crossed with “resistant” clones, and 23.0, 30.7, 37.3, 46.3, and 53.7 in crosses with “susceptible” clones. These survival values contrast sharply with the average survival of all single cross progenies and that of the commercial check (12.5%).

The average percentage of healthy plants in the greenhouse progeny tests was significantly correlated with the average survival of all single cross progeny and that of the commercial check. The value of this association is indicated by the fact that there was no appreciable difference among the average survival of resistant × resistant, resistant × susceptible × susceptible progenies. Inspection of the data showed that several poor greenhouse progenies in the field and vice versa. One clone (494—6) was classed as “resistant” in repeated clonal tests accounted for this discrepancy. If clone 494—6 had been classed as resistant the average percentage of healthy plants to the three categories in the greenhouse would have been 21.5%; resistant × resistant—22.5%; resistant × susceptible—13.6%; susceptible—11.1%.

The results obtained in this experiment show that the survival of some single cross progenies following inoculation with S. trifoliorum was sufficiently high to warrant the use of commercial Ladino clover to be of economic significance. The average percentage of healthy plants to the three categories in the greenhouse would have been 21.5%; resistant × resistant—22.5%; resistant × susceptible—13.6%; susceptible—11.1%.

The results obtained in this experiment and the survival of some single cross progenies following inoculation with S. trifoliorum was sufficiently high to warrant the use of commercial Ladino clover to be of economic significance. The average percentage of healthy plants to the three categories in the greenhouse would have been 21.5%; resistant × resistant—22.5%; resistant × susceptible—13.6%; susceptible—11.1%.

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