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Cowpea Aphid Resistance

Aphis craccivora (Koch)

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PLANT CULTURE

Greenhouse

Container.....Flat (6 x 25 x 51 cm or similar size)
Medium.....Commercial potting soil
Temp/Light.....26 ±7°C and 14+ hour day length with adequate light intensity to promote good plant growth
No. of Plants....30 to 40 per replicate in rows 2 cm apart
No. of Reps....4 minimum
Other.....Scarify seed and treat with fungicide to prevent damping-off; sow seed 1 cm deep

APHID COLONY

Source.....Colony consisting of blend of several field collections from area of adaptation, replenished annually.
Rearing.....Susceptible alfalfa plants (e.g. Ranger, Vernal) or lentils in greenhouse
Temp/Light.....20 ±7°C and 14+ hour day length with adequate light intensity to promote good plant growth. Note that the colony is reared in a cooler environment compared to the temperature at which the plants are characterized.

INFESTATION PROCEDURE

Age of plant.....1 day after emergence; cotyledon stage; count seedlings at time of infestation
Method.....Cut stems of colony plants with good aphid numbers and lay them on the flat. Remove the dried stems after aphids have migrated onto the test plants.
Alternative method....Sprinkle aphids onto the seedlings
Rate.....4 to 10 aphids per plant
Length.....Approximately 28 days; spray with insecticide (e.g. synthetic pyrethroid) to terminate infestation; rate plants 7-10 days after spraying.

RATING

1 Resistant.....Tall, with normal trifoliolates
2 Resistant.....Moderately tall, with normal trifoliolates
3 Susceptible.....Some stunting with reduced size trifoliolates
4 Susceptible.....Significant stunting with only unifoliolates or occasional small trifoliolates. The leaves are often crinkled and chlorotic
5 Resistant.....Dead

CHECK CULTIVARS

	Approximate Expected Resistance (%)	Acceptable Range of Resistance (%)
Resistant		
CW 30044	55	40-65
CUF 101	25	15-35
Susceptible		
Ranger	1	0-5

Values for resistant standards include totals for ratings 1 and 2. Percentage of plant surviving may be higher but include many plants with little or no resistance.

DISTRIBUTION AND SEVERITY OF COWPEA APHID

Historically, cowpea aphids have been a minor problem of new alfalfa stands in California. The severity of cowpea aphid infestations increased starting in the late 1990's, possibly due to a biotype shift. In 1998 economic injury was reported in the Imperial Valley of California, and has been a common occurrence in subsequent years. Since that time, cowpea aphids have also been reported as an economic pest of alfalfa in the San Joaquin Valley and the high desert areas of California and the low desert areas of California and Arizona. Outbreaks have also been reported in Minnesota, Wisconsin, Iowa, Illinois, Kansas, Missouri, Nevada, New Mexico, Oklahoma, Texas, and Washington.



Cowpea Aphid *Aphis craccivora* (Koch)

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CORRELATION TO FIELD REACTION

Field performance of alfalfa plants selected for resistance to cowpea aphids has conformed closely with results from the greenhouse.

BIOTYPES

Biotypes of cowpea aphid are assumed to exist since there has been a significant and obvious change in the temperature tolerance and preference of this aphid species. These changes have been accompanied by an increase in the distribution and severity of this aphid as a pest on alfalfa. With this evidence supporting the existence of biotypes, it is strongly recommended that cultivars be tested using aphid populations collected in areas where the cultivar will be grown.

HELPFUL INFORMATION

Aphids can be collected from field plants by tapping infested stems. Alternately, aphids can be collected using a sweep net and an aspirator. New collections of aphids should be kept in isolation for one to two generations to check for the presence of parasites. Some scientists have raised aphids individually in small cups and maintained their offspring in isolation for a time before adding them into a parasite free colony. Maintaining the aphid colony at a cooler temperature minimizes problems with parasites if they are present, but a parasite free colony is preferable. Parasites can build up rapidly in colonies and destroy the usefulness of a colony. The aphids thrive on lentils as well as on susceptible alfalfa. Some scientists prefer to raise aphids on the plant species on which the research is to be conducted to insure that the aphids perform normally. However, the authors have not noticed a reduction in aphid virulence on alfalfa even after several generations of rearing on lentils.

REFERENCES

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