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SORGHUM ENTOMOLOGY

A LITERATURE REVIEW ON THE SOURCES AND MECHANISM OF RESISTANCE TO THE SORGHUM MIDGE (*CONTARINIA SORGHICOLA*)

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This report lists the sorghum germplasm lines reported to be resistant/less susceptible to the sorghum midge in journal articles, short communications and workshops, and the progress made in screening and breeding for midge resistance. We intend to identify the most stable lines from these genotypes for use in breeding programs. It is hoped that this document will also be useful to breeders and entomologists, who are working with sorghum midge all over the world.

A LITERATURE REVIEW ON THE SOURCES AND MECHANISM OF RESISTANCE TO THE SORGHUM MIDGE (*CONTARINIA SORGHICOLA* COQ.)

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The sorghum midge, *Contarinia sorghicola*, is the most destructive pest of grain sorghum. It is very serious problem in Asian, African, Australian, European and American continents. There are many other insect-pests, diseases and disorders that may cause appreciable crop losses in sorghum locally, but there seems to be no other single species with such widespread and important effects on sorghum yields (Harris, 1976).

Current recommendations for the control of sorghum midge by cultural means are only moderately effective. Chemical control is normally costly and a large number of applications are required as infestation is often prolonged. Thresholds for insecticide application have been set. In Australia, it is recommended that treatment is started when there are six females/head (Passlow, 1973), while in Texas, the economic threshold is considered to be one female/head (Bottrell, 1971). The prospects for successful application of cultural and chemical control measures against sorghum midge in the semi-arid tropics are very low. It is practically impossible to plant at times when the midge incidence can be completely avoided but timely and early planting is in many areas effective. Normally, the farmers plant with first good showers of rains. However, all the farmers in an area do not plant simultaneously. Insecticides used for control purposes are expensive and often unobtainable by farmers with

limited means. Resistant/less susceptible genotypes offer one possible effective way of keeping the midge populations below economic threshold levels.

Reference to midge resistance in sorghum was first made by Ball and Hastings in 1912, though, Gable et al (1928) failed to find resistance to sorghum midge. Subsequently, Evelyn (1951) obtained indications of varietal resistance to midge in the Gezira (Sudan), while Bowden and Neve (1953) in the Gold Coast reported "Nunaba" as resistant to midge attack. However, Harris (1961) and Passlow (1965) found that "Nunaba" was not resistant in the absence of a more favourable host. Screening efforts in several countries in recent years have indicated the existence of a number of resistant/less susceptible lines in sorghum (Pradhan, 1971; Johnson et al, 1973; Wiseman et al, 1973; Parodi et al, 1974; Berguist et al, 1974; Rossetto et al, 1975 and Jotwani, 1978).

Wiseman and McMillan (1968) and Johnson et al (1973) reported that breeding lines converted from Ethiopian material (Zera-zera type) possess resistance to sorghum midge. The resistant lines used in the program had been collected from Sudan, Ethiopia, Uganda, India and Pakistan and belonged to six working groups, viz. Zera-zera, Caudatum, Caudatum/Nigricans, Caffrorum/Darso, Durra and Durra/Nigricans (Johnson et al, 1979). Other important lines used in breeding programs in several countries include: SGIRL-MR-1, DJ 6514 and TAM-2566; but their reaction to midge has been variable (Faris et al, 1979; Wiseman et al, 1974; Raodeo and Karanjkar, 1975; Faris et al, 1976; Syamsunder