Research Note

FIELD EVALUATION OF THE SUSCEPTIBILITY OF EIGHT SORGHUM HYBRIDS TO THE SORGHUM MIDGE, CONTARINIA SORGHICOLA *(COQUILLET) (DIPTERA: CECIDOMYIIDAE((1,2)*

The sorghum midge has recently become an important insect pest of grain sorghum [*Sorghum bicolor* (L.) Moench] in Puerto Rico[3]. Current efforts to manage this pest in Puerto Rico rely mainly on chemical control. Two midge management techniques are successfully employed in sorghum growing areas worldwide: cultural control[4] and the use of resistant, high yielding hybrids[5,6].

The life cycle and habits of this cecidomyiid fly make the use of pesticide applications largely ineffective. For example, sorghum midge larvae are protected from insecticide applications within the sorghum spikelet. In addition, adults have an ephemeral existence (i.e., 1 day), and new infestations are can occur daily in flowering sorghum fields. Consequently, insecticide usage usually becomes an expensive and ineffective operation when sorghum midge population densities are high[7], and the risk of phytotoxicity can be high[7,8].

The use of midge-resistance genes in grain sorghum has been increasing in importance worldwide. Sorghum breeding and adaptation programs emphasize local testing of high yielding hybrids with pest resistance. Because midge problems are likely to intensify in Puerto Rico with acreage expansion, we decided to evaluate currently used commercial and midge-resistant hybrids. Field plantings consisting of four randomized complete blocks, each containing seven hybrids were planted in June and September 1985 at a private farm in Santa Isabel. Adult midge populations were determined at 50% anthesis by counting the number of midges in each of 10 sequentially selected panicles per block. We estimated midge damage by randomly sampling individual mature spikelet clumps (40-60 seeds) from each of 10 panicles per hybrid per block, and examining them under a binocular microscope. Presence of pupal exuviae or larval faecal matter was taken as indication of a midge-damaged grain. An addi-

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[2]Research funded under a cooperative agreement between U.P.R. College of Agricultural Sciences and USDA-ARS, Tropical Agriculture Experiment Station, Mayagüez, P. R.

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TABLE 1.—*Percentage of grains damaged by the sorghum midge in three plantings in Puerto Rico in 1985. Mean* ± S.E. is given

Hybrid	Location		
	Santa Isabel 1	Santa Isabel 2	Lajas
WAC 716	13.8 ± 2.9a[1]	83.5 ± 3.3a	—
R1090	20.2 ± 2.4a	67.2 ± 10.8a	37.5 ± 3.5a
Dekalb 521	15.9 ± 5.7a	48.2 ± 8.0ab	15.4 ± 2.3c
Dekalb 281	17.4 ± 3.1a	32.8 ± 4.3b	30.0 ± 5.9ab
Funk HW 5692	9.2 ± 2.2a	38.9 ± 3.0b	15.6 ± 1.8c
Funk HW 6045	15.5 ± 5.1a	36.0 ± 4.3b	21.2 ± 2.7bc
ATx2755 x Tx2767	10.1 ± 2.0a	38.9 ± 5.0b	10.2 ± 1.2c
Pioneer 8244	—	—	36.3 ± 6.4a

[1]Means followed by the same letter in columns do not differ significantly at $P<0.05$, SNK procedure.

tional planting was sampled in October 1985 at the Lajas Agricultural Experiment Substation. The hybrid WAC 716 was replaced by Pioneer 8244 in this planting, whereas other test hybrids remained unchanged.

Of all hybrids examined, R1090, Pioneer 8244 and WAC 716 showed marked susceptibility to the sorghum midge (table 1). Currently, hybrid R1090 is one of the most widely planted on the island. It could be suggested to avoid use in endemic sorghum midge problem areas. On the other hand, in comparison hybrids ATx2755 x Tx2767, Funk HW5692 and Funk HW6045 demonstrated low susceptibility levels to the sorghum midge. Hybrid ATx2755 x Tx2767 is a well-known resistant sorghum developed and utilized frequently in sorghum midge research elsewhere.[5,6]

Susceptibility mechanisms involved appear to be nonpreference related, as significantly fewer adults were consistently observed on resistant hybrids than on susceptible hybrids (table 2). This form of resistance to the sorghum midge has been identified as common in sorghum[7]. Ovipositing females tend to avoid nonpreferred host plants or become very inefficient in their oviposition behavior; thus, the absolute number of ovipositions per unit time is re-

TABLE 2.—*Mean number of adult midges per panicle at 50% anthesis in two plantings in Puerto Rico*

Hybrid	Santa Isabel 2	Lajas
WAC 716	11.6 a[1]	—
R1090	7.5 a	1.8 a
Pioneer 8244	—	2.2 a
Funk HW6045	2.9 b	1.0 b
Dekalb 281	1.7 b	0.4 b
Dekalb 521	na[2]	0.5 b
Funk HW5692	na	0.6 b
ATx2755 x Tx2767	na	0.5 b

[1]Means followed by the same letter in columns do not different significantly at $P<0.05$, SNK procedure.

[2]Data could not be recorded.

duced[9]. The importance of such altered behavioral change is underscored by the short lifespan of adult midges.

Our results indicate the damage potential of the sorghum midge in Puerto Rico. up to 83.5% of the grains can be damaged if a susceptible hybrid is chosen in areas of endemic midge problems. This preliminary investigation on the susceptibility of grain sorghum to the sorghum midge illustrates the need to continue this profitable line of research for selecting the most appropriate hybrids for commercial production.

Alejandro E. Segarra-Carmona
Assistant Entomologist
Antonio Sotomayor-Ríos
USDA-TARS, Mayagüez, P. R.
Salvio Torres-Cardona
USDA-TARS, Mayagüex, P. R.
Adolfo Quiles-Belén
USDA-TARS, Mayagüez, P. R.

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