Research Application Summary

Response of sorghum genotypes to indigenous and exotic stem borers in Kenya

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Abstract

Field trials are being conduced in Kenya to identify sources of resistance, especially multiple resistance to *Buseola fusca* and *Chilo partellus,* two devastating pests of maize in sub-Saharan Africa. Genotypes ICSB 464, ICSB 467, Macia, IESV91131DL and ICSA 473 have indicated multiple resistance to the two pests. Further trials are planned.

Key words: *Buseola fusca, Chilo partellus,* Kenya, maize

Résumé

Des essais pratiques sont conduits au Kenya pour identifier des sources de résistance, particulièrement la résistance multiple face au *Buseola fusca* et *Chilo partellus*, deux parasites dévastateurs de maïs en Afrique Sub-saharienne. Les génotypes ICSB 464, ICSB 467, Macia, IESV91131DL et ICSA 473 ont indiqué la résistance multiple aux deux parasites. D'autres essais sont prévus.

Mots clés: *Buseola fusca, Chilo partellus,* Kenya, maïs

Background

Sorghum, *Sorghum bicolor* (L.) is an important food grain for many of the world's most food insecure people in semi arid regions in Africa, Asia and Latin America. Among the constraints limiting sorghum production in East Africa are insect pests, especially stem borers like *Buseola fusca* and *Chilo partellus* which are associated with 15-80% yield loss (Rami *et al.,* 2002). Several insect control strategies such as crop rotation, field sanitation, introduction of parasitoids such as *Cotesia clavipes* and use of synthetic pesticide such as furadan have been employed but have not fully contained the problem suggesting a need for developing a more sustainable control measure (Sharma *et al.,* 2007). The most sustainable way of managing insect problems under subsistence farming is through host plant resistance, which contributes significantly to economic benefits and sustainable agricultural systems. However, progress in breeding for stem borer resistance has been slow due to inadequate understanding of the genetics of resistance and tolerance, and the complex interactions of resistance factors with environmental factors (Sharma *et al.*, 2007).

Literature Summary

Major emphasis in Africa has been on screening sorghum against *B. fusca* and *C. partellus* (Kishore *et al.*, 2007). Indeed, efforts have been ongoing in Africa to identify sources of stem borer resistance in cereal crops, but high levels of resistance have not been reported (Kumar, 2005). It has been documented that sorghum varieties resistant to one stem borer species are not necessary resistant to others. Therefore, it is important that sources of multiple resistance to stem borers are selected to ensure more durable resistance in sorghum.

Genetic variability among sorghum genotypes has been demonstrated (Jose *et al.*, 2001). Knowledge of sorghum resistant germplasm is an invaluable aid for sorghum improvement with increased level of resistance to *B. fusca* and *C. partellus*. A key objective of ICRISAT is to identify sources of resistance for stem borers from the world germplasm, and use them in the insect pest resistance-breeding program. The objectives of this study were to identify sources of resistance to both *B. fusca* and *C. partellus* in sorghum, determine nature of inheritance of resistance to *B. fusca* and *C. partellus* in selected sorghum germplasm and determine interactions between genetic and environmental factors for resistance to *B. fusca* and *C. partellus* in sorghum.

Study Description

The experiments to study resistance to *C. partellus* and *B. fusca* in sorghum were conducted in two sites in Kenya, namely at Kenya Agricultural Research Station (KARI) Kiboko and University of Nairobi, Kabete field station. The two sites were selected based on the prevalence of these two bores in lowlands and highlands, respectively. This activity will be continued during the 2010 and 2011 (A) and (B) seasons. Seasons A and B represent short and long rains, respectively. Twenty-seven genotypes were planted in a lattice design consisting of nine rows in three blocks and replicated twice. The genotypes were sown in 2m rows, 0.75m interspacing with 0.25m intraspacing. After thinning, each row consisted of 10 plants. At 30 days after planting, 5 plants on each row were inoculated on the central whorles with 5 *Busseola* and *Chilo* neonates/plant. The experiment will be conducted for two seasons at both sites. Parameters monitored include: At 45 to 55 days after planting, leaf feeding, leaf injured plants (%) and deadhearts (%). At 70-

80 days; plant pigment (purple or tan), leaf midrib colour, waxy bloom (scored on 1-9 scale). At milk stage, plant heights (cm) are measured. At harvest; panicle length, glume colour, presence of awns, grain pericarp colour, number of exit holes, stem tunneling (%), numbers of tillers, harvestable panicles, chaffy grains/broken panicles and weight of 1000 seed mass (g) are assessed.

Research Application

Based on deadhearts development, genotypes Swarna, DJ 6514 and Gadam were susceptible to both borers. Genotypes ICSA 474, IS 8193, TAM 2566, IS 1044, ICSV 700 were tolerant to *C. partellus* but susceptible to *B. fusca.* Genotype IESV 91104 DL was tolerant to *B. fusca* but susceptible to *C. partellus.* Genotypes ICSB 464, ICSB 467, Macia, IESV91131DL and ICSA 473 showed tolerance to both *B. fusca* and *C. partellus.* These genotypes will be evaluated for two additional seasons.

Once identified, the sources of resistance to both *B. fusca* and *C. partellus* should be introgressed to the local preferred but susceptible genotypes.

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