

Biological control of preharvest kernel infection by *Aspergillus flavus* in groundnut, 2001.

Six isolates of three *Trichoderma* species and one unknown (T13: *T. harzianum*; T16: *T. longibrachiatum*; T17: *T. viride*; T20: *T. viride*; T23: *T. harzianum* and T28: *Trichoderma* sp.), and three isolates of *Pseudomonas fluorescens* (Pf 153, Pf 76 and Pf 2) that were highly antagonistic to a toxigenic strain of *Aspergillus flavus* (Af 11-4) *in vitro* were evaluated in field experiments for their biocontrol potential against kernel infection by *A. flavus* at ICRISAT, Patancheru. Healthy and sound seeds of cv. JL 24 were coated with spores (ca. 1×10^9 ml⁻¹) of the above biocontrol agents (BCA), using bentonite as filler and carboxy methyl cellulose (0.5%) as sticker. Dried BCA-coated seeds were planted on 28 Jul 00 for the rainy season experiment and 4 Jan 01 for the post-rainy season experiment. The field soil type was a fine sandy loam. The experiments were conducted in a randomized complete block design with 10 treatments, including control (no BCA application), and replicated four times. The individual plots consisted of 2 rows of 4 m long, 60 cm apart, and 10 cm between plants in a row. Inoculum of a toxigenic strain (Af 11-4) was multiplied on autoclaved pearl millet seeds and applied at the flowering stage (40 days after seedling emergence) in a furrow adjacent to the plant rows and irrigation was provided by overhead sprinklers. The second dose of BCAs (20 g of farmyard manure mixed with spores to a concentration of 1×10^9 g⁻¹) was applied in the rhizosphere at the peg-formation stage (60 days after seedling emergence) in each plot and a light irrigation was provided. The end-season drought was imposed (about 60% soil moisture deficit) by withholding irrigation 80 days prior to harvest of the crop. The crops were harvested on 29 Nov 00 and 28 Apr 01 for the two experiments. After pod drying and threshing, kernel weight was recorded for each plot. From each plot 100 kernels were plated on Czapox Dox Agar supplemented with rose bengal and Streptomycin, and incubated in dark at 28°C for four days. Kernels infected with *A. flavus* were recorded and percent of infection was calculated.

In both experiments, all the BCAs reduced the kernel infection by *A. flavus* (Af 11-4) significantly over the control. Two isolates of *T. viride* (T-17 and T-20) and one of *T. harzianum* (T-23) were relatively more effective in reducing the kernel infection than others. Among *Pseudomonads*, isolate Pf 2 and Pf 76 were also equally effective in reducing kernel infection. However, Pf 153 showed inconsistency in reducing the kernel infection in the two experiments. These five antagonists appeared quite promising by reducing the kernel infection by more than 70%. Reduction in kernel infection was more pronounced during the postrainy season than during the rainy season experiment. This may have been primarily due to better management of moisture stress during the postrainy season than in the rainy season. These BCAs had no adverse effects on kernel yield, and in some cases, relative increase in yield over control was recorded. Further testing of these isolates in combination with other management methods is in progress to develop an integrated management of aflatoxin contamination in groundnut.

BCA designation	Kernel infection (%) ^a		Kernel yield (g/plot) ^b	
	2000R ^c	2001P ^d	2000R ^c	2001P ^d
<i>T. harzianum</i> (T13).....	19	31	249	223
<i>T. longibrachiatum</i> (T16).....	11	34	305	189
<i>T. viride</i> (T17).....	18	11	205	195
<i>T. viride</i> (T20).....	15	14	313	177
<i>T. harzianum</i> (T23).....	18	5	253	238
<i>Trichoderma</i> sp. (T 28).....	21	25	211	184
<i>P. fluorescens</i> (Pf 153).....	26	1	187	236
<i>P. fluorescens</i> (Pf 76).....	12	11	275	173
<i>P. fluorescens</i> (Pf 2).....	17	12	243	206
No BCA-Control.....	34	62	226	201
LSD (<i>P</i> <0.05).....	6.5	10.4	120.0	101.9

^aMean of 4 replications with 100 seeds/rep.

^bMean of four replications

^cPatancheru field experiment during the rainy season, Jul-Nov 00.

^dPatancheru field experiment during the postrainy season, Jan-Apr 01.