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Short communication

Control of seedling diseases of groundnut in Niger†

(*Keywords:* Groundnut, peanut, arachide, *Arachis hypogaea*, seedling diseases, Niger, West Africa)

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Abstract. Field trials conducted with groundnut (*Arachis hypogaea* L.) at three different locations in Niger, using seed-protectant chemicals, showed a large reduction in plant stand on non-treated plots. The reduction in plant stand was largely due to pre-emergence seed and seedling rots, caused by *Aspergillus niger, A. flavus, Rhizoctonia solani, Macrophomina phaseolina* and species of *Rhizopus, Fusarium* and *Pythium*. Losses in pod yields in non-treated plots were substantial and varied over locations. Seed treatment with thiram was very effective in improving plant stand and pod yields at all locations.

1. Introduction

Seedling diseases of groundnut (*Arachis hypogaea* L.) are economically important in all major groundnut-producing areas of Niger (Subrahmanyam, 1988). Young seedlings are attacked by a variety of seed- and soil-borne fungi including *Aspergillus niger* van Tiegh., *A. flavus* Link. ex. Fr., *Rhizoctonia solani* Kuhn, *Macrophomina phaseolina* (Tassi.) Goid., and several species of *Rhizopus, Fusarium* and *Pythium*, resulting in pre-emergence mortality. Post-emergence seedling diseases include collar/crown rot (*A. niger*), aflaroot (*A. flavus*) and root rot (*R. solani, M. phaseolina* and *Pythium spp.*). Disease surveys carried out in Niger in 1986 and 1987 showed severe reductions in plant stand due to seedling diseases in many farmers' fields (Subrahmanyam *et al.* 1990). Seedling diseases are particularly serious when poor-quality seed is used for planting. High fluctuations in soil moisture soon after planting, which are common in Niger, also lead to high incidence of seedling diseases.

This paper reports the losses in plant stand and pod yields of groundnut from seedling diseases at three different locations in Niger during the 1987 and 1988 rainy seasons.

2. Materials and methods

Trials were conducted under rainfed conditions at Sadoré, Bengou and Maradi, Niger. The long-term mean rainfall is 560 mm at Sadoré, 840 mm at Bengou and 640 mm at Maradi. Most of the rainfall is received between June and September. The soils are sandy at Sadoré and Maradi, and loamy at Bengou.

Seeds of a short-cycle Spanish variety 55–437 were treated with four seed-protectant chemicals (Table 1) at the rate of 3 g kg^{-1} seed just before sowing. Untreated seed was the control. Field plots were arranged in a randomized-block design with four replications. Seeds were sown singly at 10-cm spacing along 40-cm (in 1987) or 50-cm (in 1988) rows at about the optimum time (end of June). Plant stand was measured 20 days after sowing. Plots were harvested at optimum maturity and yields of dried pods was recorded.

3. Results and discussion

In 1987 there was a heavy reduction in plant stand due to seedling diseases at Sadoré (26%), Bengou (23%), and Maradi (27%) (Table 1). These losses in plant stand were largely due to pre-emergence seedling rots caused by *A. niger, A. flavus, R. solani, M. phaseolina* and species of *Rhizopus* and *Fusarium*. The losses in pod yield were considerable at Sadoré (24%) and Maradi (19%) but only 4% in Bengou. The losses in plant stand were also large during the 1988 crop season at Sadoré (11%), Bengou (24%) and Maradi (16%). At Bengou the loss was largely due to *Pythium* damping-off because of damp conditions at emergence. The loss in pod yield was considerable at Maradi (19%), but only 8% at Sadoré and 9% at Bengou.

Rainfall was high and well distributed in both years at Bengou. Plant growth was very vigorous. Although there was a heavy reduction in plant stand due to seedling diseases, the losses in pod yield were only marginal because of the compensating effect of neighbouring plants. In Maradi, rainfall was very erratic in both years, resulting in poor crop growth. Losses in plant stand and yield were very high in both years. In Sadoré, rainfall was not satisfactory in 1987 and crop growth was very poor. Loss in plant stand resulted in a heavy loss in pod yield. These results clearly show that seedling diseases are economically important in Niger. However, the magnitude of subsequent yield losses varies considerably over a period of years, and is largely dependent on environmental factors. Yield losses are substantial when the crop is subjected to drought and in low-

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Table 1. Effect of seed treatment on plant stand and pod yield of groundnut (cv 55–437) at three locations in Niger during the 1987 and crop seasons.

	Sadoré				Bengou				Maradi			
	Plant stand[b] ($\times 1000$ ha^{-1})		Pod yield (t ha^{-1})		Plant stand[b] ($\times 1000$ ha^{-1})		Pod yield (t ha^{-1})		Plant stand[b] ($\times 1000$ ha^{-1})		Pod yield (t ha^{-1})	
Treatment[a]	1987	1988	1987	1988	1987	1988	1987	1988	1987	1988	1987	1988
Thiram 75% WP[c]	230	187	0·58	3.26	210	175	3·54	2·66	150	176	0·71	0·75
Thioral (R)[d]	220	186	0·56	3·21	220	156	3·45	2·52	120	163	0·66	0·74
Apron (R) plus 50 DS[e]	210	178	0·57	3·04	190	171	3·38	2·62	140	171	0·57	0·71
Bavistin (R) 50% WP[f]	210	174	0·51	3·20	220	140	3·35	2·43	140	159	0·70	0·71
Control	170	167	0·45	3·00	170	133	3·32	2·42	110	147	0·57	0·61
SE	±1	±3	±0·06	±0·17	±1	±4	±0·22	±0·18	±1	±6	±0·04	±0·06
CV (%)	8	3	23	11	8	5	13	14	21	7	11	18

[a] Seeds were treated with seed-protectant chemicals (3 g ha^{-1} seed) just before sowing.
[b] Measured at 20 days after sowing.
[c] Tetramethylthuram disulphide.
[d] Tetramethylthiuram disulphide (25%) + heptachlor (20%).
[e] Furathiocarb (34%) + metalaxyl (10%) + carboxin (6%).
[f] Carbendazim.

fertility areas, resulting in poor crop growth which is unable to compensate for reduced plant stands.

Seed treatment with thiram was found to be very effective in reducing losses in plant stand and pod yields due to seedling diseases at all locations. Seedling diseases can also be controlled by using high-quality seed for planting and by avoiding deep planting, as etiolated seedlings are highly susceptible to these pathogens. Farmers should be advised on the use of these practices to control seedling diseases of groundnut in Niger.

References

SUBRAHMANYAM, P., 1988. Diseases of groundnut in West Africa and their management: research problems, priorities and future strategies. Paper presented at the First Regional Groundnut Meeting held at the ICRISAT Sahelian Center, Niamey, Niger, 13–16 September 1988.

SUBRAHMANYAM, P., HASSANE, H., SMITH, D. H., MOUNKAILA, A. and NDUNGURU, B. J., 1990. Diseases of groundnut in Niger. *Oléagineux* (under review).