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Effects of Intercropping Cowpea with Sugarcane

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Field experiments were conducted at Unilorin Sugar Research Institute farm to assess effects of different cowpea population intercropped with sugarcane on growth and quality of sugarcane. Co 957 as a standard commercial variety in Nigeria was used during the cropping seasons 1992 and 1993 for plant and ratoon crop respectively. Three budded setts were planted at standard spacing (75000 setts ha^{-1}). Early maturing cowpea cultivar 11 TA.84E.124 was used as intercrop @ 25, 50, 75 and 100% of the recommended (111,111 plants ha^{-1}) sole cowpea plant population.

The trial was laid out in a randomized complete block design RCB having plot size of 5m x 9m with four replications. Normal intercultural operations were done for both sugarcane and intercrop. Cowpea and plant cane were harvested at 67 days after planting (DAP) and 300 DAP respectively. The cane stubbles were allowed to grow as first ratoon, and cowpea was planted again be taken two sugarcane rows first ratoon. The cane were irrigated by using sprinklers during dry months. The cowpea was sprayed against insects with Karate (lanbda-cyhalotrin) @ 50 ml in 120 l of water by a knapsack sprayer. It was fertilized with SSP @ 40 kg P205 ha^{-1} at planting while sugarcane received 80 kg N, 60 kg P205 and 60 kg K20 ha^{-1} immediately after cowpea harvest.

A sigificantly higher stalk population was observed in treatments having different cowpea population in ratoon cane. In the plant cane, the highest stalk population was obtained when sugarcane was grown with 100% population of cowpea intercrop. Sole sugarcane had significantly lower stalk population than intercropped treatments population as in ratoon cane. Although the highest cane population was obtained at 100% cowpea population density, but did not significantly differed brone 50% cowpea population in the sugarcane. This indicated that intercrop competition had little effects on sugarcane stalk population and not sufficient strong to have negative effects on stalk population of sugarcane. The least number of tillers was obtained in sole sugarcane in the ratoon cane indicating positive effects of cowpea in association with sugarcane. This could be the contribution of cowpea to soil nitrogen which helped in boosting cane growth and tillering (Table 1).

In plant crop, the tallest stalk was obtained in sole sugarcane but this was, however not signifgicantly taller than cane stalks obtained at treatment having 100% cowpea population. The shortest stalk was obtained at 25% cowpea population density which was not significantly shorter than stalks treatments having at 50% and 75% cowpea population densities.

Intercropping had no significant effects on internode number and cane stalk diameter. These two parameters in sole cane and intercropped sugarcane were comparable in both plant and ratoon cane indicating that cowpea intercropping system had no deleterious effects on cane growth. No appreciable response of sugarcane to stalk diameter of intercropping and other cultural practices were reported by Mendoza (1986). Irvine and Benda (1980), however, obtained significant increases in stalk diameter by increasing interrow spacing in sugarcane. This finding is also in agreement with Agbana (1991) which indicated that cowpea intercropping with sugarcane was feasible.

The Brix (total soluble solids) at 40 WAP in the plant cane and ratoon cane did not vary significantly between sole and intercropped cane showing that the intercropping had no adverse effects on cane juice quality. The Brix values obtained in both cropping cycles in sole and intercropped cane compared favourably with minimum levels acceptable in commercial sugarcane estates in the Guinea Savanna as estimated by Agbana (1991).

Table 1. Effects of intercropping cowpea with plant and ratoon cane.

Component crops population ratio	Plant cane					
	Stalk population (000/ha)	Stalk length (cm)	Stalk diameter (cm)	No of inter-nodes stalk^{-1}	Brix (%) 24 WAP	Brix (%) 40 WAP
Sole sugarcane	360 c	120.2 a	2.1 a	12 a	18.7 a	23.0 a
Sugarcane+25% cowpea	360 c	100.5 b	1.0 a	13 a	18.3 a	22.0 b
Sugarcane+50% cowpea	300 c	100.6 b	2.1 a	13 a	18.5 a	23.0 a
Sugarcane+75% cowpea	300 c	100.8 b	1.9 a	12 a	18.2 a	22.1 a
Sugarcane+100% cowpea	342 b	120.1 a	2.1 a	12 a	14.6 b	21.8 a

Component crops population ratio	Ratoon cane					
	Stalk population (000/ha)	Stalk length (cm)	Stalk diameter (cm)	No of inter-nodes stalk^{-1}	Brix (%) 24 WAP	Brix (%) 40 WAP
Sole sugarcane	390 c	100.2 c	2.4 c	15 a	20.8 a	22.1 a
Sugarcane+25% cowpea	423 b	102.5 c	2.4 a	16 a	19.5 a	23.0 a
Sugarcane+50% cowpea	487 a	112.4 b	2.5 a	16 a	20.1 a	21.8 a

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Curvularia Leaf Spot: A New Disease of Sugarcane in Nigeria

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Curvularia leaf spot of sugarcane is caused by the anamorph of *Cochliobolus lunatus* and *Curvularia lunata* (Eakker) Boedijin and is said to be of minor importance (Sivanesan and Waller, 1986). C. *lunata* is a soil fungus favoured by high temperature and moisture (Magie, 1953). It is a facultative pathogen best known as the cause of germination failure and seedling blight of cereals and other monocotyledons. The disease has been associated with lesions on stem, foliage and floral parts in a wide variety of hosts (Sivanesan and Waller, 1986). The disease has been observed on sugarcane in Uganda, French Equatorial Africa and India. In India and Hawaii, it causes seedling blight. It has also been isolated from infected seedlings in a sugarcane nursery in Argentina (Sivanesan and Waller, 1986).

Ellis (1971) listed 33 species of Curvularia as occurring on many grasses of tropical origin. Of these specices *C. cymbopogonis* (C.W. Dodge) Groves and Solko has been reported on *Andropogonia* in Jamaica, Sudan and West Africa. *C.* lunata, the most common and cosmopolitan species has been reported on Zea mays and was also implicated among a complex of fungi as causal organism of leaf blast of sugarcane in Nigeria (Awoderu and Okusanya 1978). *C. senegalensis* (Speg) Subram has reportedly been isolated from Urena, Zea, paint work and soil from India, Kenya and Nigeria. It is also known to cause seedling blight of sugarcane in Hawaii (Sivanensan and Waller, 1986). *C. trifolii* is most commonly found on Trifolium but can occasionally occur on grasses and has been reported from Austratila, Ghana, Kenya, Papua New Guinea, Portugal, Sierra-Leone, Tanzania, the USA and Nigera (Ellis 1971). It had earlier been reported on clover in the USA (Hanson and Kreitlow, 1953). This report is the first record of *Curvularia* leaf spot disease of sugarcane in Nigeria.

Infected leaves of cultivar USRI 86/25 were collected from the three plots for laboratory studies. The leaves were washed under running tap water and then cut into small; I cm^2 pieces at the junction of infected and healthy areas and were aseptically prepared in 20% sodium hypochlorite solution for five minutes. The inocula were then washed in three changes of sterile water. Three pieces of the inocula were planted on potato dextrose agar (PDA) in each of the 36 petridishes. The plates were then incubated at room temperature ($28+2^0C$) and observed for fungal growth. Subcultures were transferred to fresh PDA in different petri dishes after 5 days. The isolates were grown on water agar and brought to pure by peral culture by the hyperial tip method. They were transferred back to PDA after 3 days. Eight isolates were planted and labelled Sp I -Sp 8 and their radial growth monitored for 10 days. Another set of the isolates was

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transferred into McCanthy bottles for further laboratory studies and identification. Prior to identification the isolates were transferred onto tomato juice agar (TJA) and grown at 25^0C under a cycle of 12 h near-ultraviolet light and 12 h of dark. The isolates were identified according to Ellis (1971).

The following fungi isolates were identified from the diseased leaves of cultivar USRI 86/25:

Spl *Aspergillus* sp
Sp2 *Curvularia lunata*
Sp3 *Aspergillus* sp
Sp4 *Curvularia trifolii*
Sp5 *Curvularia lunata* (most likely, but few spores present)
Sp6 *Curvularia senegalensis*
Sp7 C. *cymbopogonis*
Sp8 *Curvularia* sp (based on mycelial characteristics), on spores present.

Figure 1 shows the radial growth of 6 of the 8 isolates on PDA as measured on 10 days after planting. Sp1 and Sp3 were identified as *Aspergillus* spp. and were not included in the figure since the genus is a known saprophyte (Rossman et al. 1987). All the isolates had grown to some extent by the first day. Extent of growth of the 6 isolates were not the same. Isolates Sp6, Sp7 ansd Sp8 grew rapidly extending up to 20mm by the first days. Sp5 grew the least on the first day (5mm); next slowest was Sp4 (10mm). The radial growth of most of the isolates was gradual during the first 3 days. Thereafter, Sp2, Sp6 and Sp7 grew rapidly. However, Sp4, Sp5 and Sp8 grew gradually up to the 6th day after which they rapidly increased and filled the plate or maintained steady growth as shown in Fig. 1.

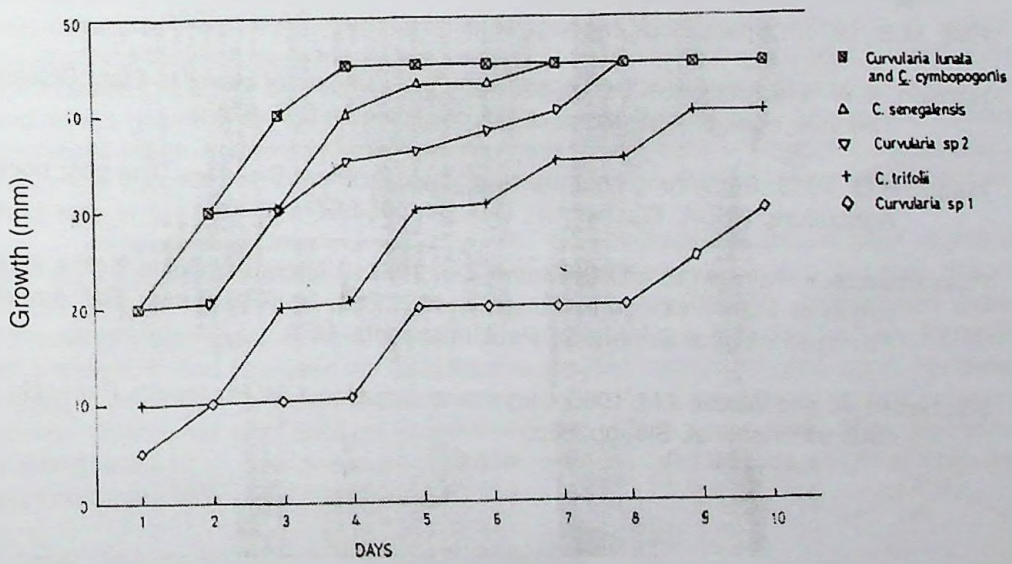

Fig. Radial Growth of Fungi Isolates on PDA for 10 Days after Planting.

Generally, Sp5 grew slower; followed by Sp4. Not all the *Curvularia* spp. identified from this study have been reported on sugarcane in other parts of the world (Sivanesan and Waller, 1986). *Curvularia lunata* was implicated among a complex of fungi as the causal organism of sugarcane leaf blast in Nigera (Awoderu and Okusanya, 1978). However, Sivanesan Waller (1986) have reported *C. lunata* as incitant of *Curvularia* leaf spot disease of sugarcane in different parts of sugarcane-growing area. *C.* cymbopogonis, *C. trifolii* and the other suspected *Curvularia* species have not been isolated from or reported on sugarcane in Nigeria or elsewhere (Magie, 1953; Ellis, 1971; Sivanesan and Waller, 1986). The report from the present study is a preliminary one and pathogenicity test has not been completed on the isolates to confirm their role either singularly or as a complex in the leaf spot disease observed on cultivar USRI 86/25.

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