STUDIES ON PEST MANAGEMENT PRACTICES FOR THE SWEET POTATO WEEVIL (*CYLAS PUNCTICOLLIS*) BOHEMAN (COLEOPTERA: APIONIDAE) IN SIERRA LEONE

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ABSTRACT

Studies on pest management practices for the sweet potato weevil (*Cylas puncticollis* Boheman (Coleoptera: Apionidae) were conducted at the Institute of Agricultural Research (IAR) Farms at Njala and Ogoo Farm from September, 1994 to January, 1996.

Fifteen sweet potato clones were evaluated for resistance to attack by the weevil *C. puncticollis*. The clones differed significantly in numbers of damaged tubers, undamaged tubers and weight of damaged tubers. 82/123 (red), Madam and 87/131 had the highest numbers of damaged tubers with mean values of 15.8, 16.8 and 17.0 respectively. Clones with low numbers of damaged tubers included 82/144, 93/03 and 93/04 with mean values of 4.0, 3.8 and 3.0 respectively.

Tuber characteristics such as neck length, depth placement, tuber length, width, cortex thickness, numbers of tubers per plant and percent dry matter content were significantly different among the clones tested. 82/123 (red) and Njala White had long tuber necks with values of 7.6 cm and 9.3 cm respectively, while 87/06 and 87/37 had short necks with values of 3.2 cm and 3.3 cm, respectively.

Njala White and Njala Wonder had deep tuber placements with values of 9.7 cm and 9.5 cm, respectively, while 87/06, 84/16 and 82/123 (white) had short tuber placement depths with values of 5.6 cm, 5.4 cm and 5.3 cm, respectively. Clones with long tubers included 82/144 and 84/17 with values of 11.9 cm and 12.0 cm, respectively, while 93/04 and Madam had short tuber lengths with values of 8.2 cm and 8.1 cm, respectively. Tuber widths were highest in clones 87/37 and 87/06 with values of 4.7 cm and 5.4 cm, respectively, while Njala Wonder and Njala White had smaller widths with values of 3.0 cm and 2.9 cm, respectively.

Tuber cortex was thickest in 87/131 and thinnest in 93/03 with values of 8.7 mm and 1.2 mm, respectively. Madam and 84/16 had the highest numbers of tubers per plant with mean values of 6.0 and 6.7, respectively while Ropot II and 93/03 had the least with values of 2.8 and 2.2, respectively. Percent dry matter content was higher in 93/04, TIS-2532 and 93/03 with values of 36.9, 37.1 and 39.3 and lowest for Madam with a value of 29.7.

The percent damaged tubers was negatively correlated with: (a) mean numbers of tubers per plant, (b) tuber neck length, and (c) tuber depth placement; while the percent damaged tubers was positively correlated with: (a) tuber cortex thickness, and (b)total numbers of weevils. The correlation between percent damaged tubers and total numbers of weevils was highly significant (r=0.759**). Thus clones having tubers with long necks, deep placement and high dry matter content were attacked less by the weevils.

Other tuber characteristics of the sweet potato plants which appeared to have influenced low weevil infestation and damage were: white fleshed tubers and skins, enlongated tubers and dispersed tuber formation. Conversely,clones that were heavily damaged had tubers that were red fleshed and skinned, elliptical, short necked, shallowed placement, clustered formation and low in dry matter contents. Thus clones with tuber characters such as long necks, deep placement, high dry matter content, white colour and dispersed formation should be further evaluated for their bases of resistance with a view to using them either as indices for identifying resistant clones or in plant breeding programmes incorporating resistance in sweet potato to *Cylas* weevil attack.
An experiment to determine the optimum time for planting second season sweet potato with regard to weevil infestation was undertaken using three dates of planting and two clones. The numbers of larvae, adults and total weevils and percent damaged tubers increased as planting was delayed after 1st September. The

mean values for numbers of larvae and numbers of larvae and adults for tubers of Njala White planted on 1st and 30th September were 8.7 and 128.7 and 9.0 and 152.7, respectively. Comparable values for 82/123 (red) were 257.3 and 647.3 and 316.0 and 730.7, respectively. The percent adult weevils and tuber length were not affected by delayed planting.

Plant characters such as tuber width, number of tubers per plant, total weight of tubers and dry matter content of tubers reduced as planting was delayed. This would indicate that delayed planting exposed the crop to higher weevil infestation and also reduced tuber yields.

For each of the planting dates, 82/123 (red) had higher mean values than Njala White for most of the parameters measured i.e. numbers of larvae, numbers of adults, total numbers of weevils (larvae and adults), numbers of damaged tubers, percent damaged tubers, tuber width, tuber length and total weight of tubers. Thus indicating that Njala White was less susceptible to weevil attack than 82/123 (red).

Significant positive correlations were obtained between planting date and weevil incidence in both clones (except number of adults for 82/123 (red) in the Njala experiment) while sifnificant negative correlations were obtained for both clones betwen planting date and total weight of tubers. The correlations for Ogoo Farm were similar to those obtained at Njala except that percent dry matter content of the tubers was positively correlated with planting time for both clones. These further confirm that delay in planting the sweet potato crop exposed it to higher weevil infestation and reduced tuber yields. Thus it is suggested that for the second cropping of sweet potato in Sierra Leone, planting should be restricted to within the first half of September.

A study to determine the proximate time for harvesting second season sweet potato crop with regard to weevil infestation was undertaken using three dates of harvesting and two clones. For each of the two clones, the mean numbers of larvae, adult weevils, total weevils (larvae and adults), the weight and percent of damaged tubers, the total weight of tubers, and percent dry matter content of tubers increased as harvest dates were delayed. For example, the numbers of larvae and adults for tubers of Njala White harvested at 13 and 17 weeks after planting were 7 and 142 and 0 and 23, respectively. Comparable values for 82/123 (red) were 175 and 701 and 15 and 114, respectively. Delaying harvest time had no effect on tuber width, tuber length and numbers of tubers per plant. Thus early harvesting had the twin advantages of reduced weevil infestation on the crop and at the same time tuber characteristics were not significantly reduced compared with late harvested crops. For each harvest date 82/123 (red) had higher levels of weevil infestation and damage than Njala White. For example, at 17 weeks after planting, the mean numbers of larvae and total weevils counted from harvested tubers of 82/123 (red) were 701.3 and 815.7, respectively. Comparable infestation levels for Njala White were 142.0 for larvae and 165.0 for total weevils. Again confirming that Njala White was less susceptible to weevil attack than 82/123 (red). Regression analyses indicated significant positive correlations between harvest dates and (a) weevil incidence, and (b) damage levels for both clones. These taken together would suggest emphasis on early harvesting of sweet potato tubers as a way of minimising weevil infestation. In this study 13-15 weeks after planting would appear to be a suitable time for proximate harvesting of tubers. Adult weevils were collected at Njala and Ogoo Farm for determination of species composition. All the weevils collected were identified as *C. puncticollis*. Distinguishing features were: a distinctly arched protonium in the lateral view, a very evident posterior constriction, narrowly separated eyes in the dorsal view, a uniformly black thorax and the possession of

four pairs of sclerites on the internal sac of the aedeagus. These features were common to all the adult *Cylas* weevils collected from the two experimental sites.

Cylas weevil larvae were collected for larval instar determination from both Njala and Ogoo Farm using head capsule width measurements. Five non-overlapping larval instars were obtained for larvae collected from (a) Njala, and (b) Ogoo Farm. The mean head capsule widths were 0.26 mm, 0.46 mm, 0.65 mm, 0.90 mm and 1.17 mm for the 1st, 2nd, 3rd, 4th and 5th larval instars, respectively for those collected from Njala. Head capsule width increments from one instar to the next ranged from 0.19-0.27 mm with a mean of 0.23 mm. These increments were not significantly different ($t=23.56$; $P<0.05$) and they conformed to Dyar's rule ($t=28.09$; $P<0.05$). Similarly, for the Ogoo Farm collection, mean head capsule widths were 0.26 mm, 0.46 mm, 0.65 mm, 0.92 mm and 1.14 mm for the 1st, 2nd, 3rd, 4th and 5th larval instars, respectively. Head capsule width increments from one instar to the next ranged from 0.19-0.27 mm with an average of 0.22 mm. These increments were not significantly different ($t=24.73$; $P<0.05$) and also conformed to Dyar's rule ($t=26.24$; $P<0.05$).