ASSESSMENT OF YIELD LOSSES CAUSED BY COMMON BACTERIAL BLIGHT OF BEANS IN UGANDA

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Common bacterial blight (CBB), caused by *Xanthomonas campestris* pv. *phaseoli*, is the second most prevalent disease on beans in Uganda, after angular leaf spot (Sengooba, 1985). The disease is important in the lowland high rainfall areas where beans are most important in the diet as a protein supplement to the staple 'Matoke'. Despite high prevalence and the importance attached to this disease on beans, the losses caused by CBB in Uganda are not known. The work reported here was designed to quantify the yield losses associated with CBB on beans in this country.

Two techniques (a paired plant and field plot) were used in determining the yield loss caused by CBB on beans in the field. The study was run for three seasons (1990A, 1990B and 1991A) at Bukalasa experimental station (fifty kilometres North of Kampala). In the field plot technique, plots were compared for disease and yield. Different levels of disease were generated by using three chemical treatments (cupric carbonate, cupric sulphate and water); three bean genotypes (Kanyebwa, K 20 and XAN 112) each with different reactions to CBB (susceptible, intermediate and resistant, respectively), with seed of different symptom categories (severely diseased, slightly diseased and symptomless) for each variety. The experimental design was a split plot with chemicals as main plots and varieties x categories of seeds as sub-plots. Fungal diseases were controlled by weekly sprays of Dithane M45 alternated by Benlate for all plots. Aphids (the only insect problem encountered) were controlled by two sprays of Ambush. Severity and incidence were assessed from preflowering (R5) to physiological maturity at weekly intervals. A 1-9 scale was used for assessing severity. Total and clean seed yields were taken at harvest. Regression analysis to evaluate the relationship between disease incidence and yield employed the SPSS/PC V.3 programme.

In the paired plant technique, pairs of healthy and diseased plants in the plots were compared. Plots were the same as were used in the field plot method described above. The pairs selected were as similar as possible (i.e same variety, same growth habit and vigour), differing only in their susceptibility to CBB. The disease scores of each plant were taken at R8 and before harvest, using a 1-9 scale (where 1 = no disease, and 9 = 75-100% infection). Each plant was harvested separately and yields compared using a paired t-test.

Multiple regression analysis showed that CBB causes yield depressions in beans at all stages of development. However, significant yield losses occurred when plants were affected between flowering (R6) and pod filling (R8).

Using severity as the parameter, yield reduction for each 1% increase of disease was as follows : 32.2 kg/ha in season 1990A at R8; 10.5 kg/ha and 11.5 kg/ha at R6 and R7, respectively, in 1990B; and 76 kg/ha at R8 in 1991A. For incidence, expressed as the percentage number of leaves affected in 1990B, there was a yield loss of 11.5 kg/ha at R7 for every 1% increase in the number of leaves affected. In 1990A, the loss was 3.5 kg/ha at R7 and 5.0 kg/ha at R8 for the same increase in the number of leaves. In 1990A, no significant yield depression was associated with the number of leaves affected. When varieties were analysed separately, it was found that Kanyebwa had the heaviest loss, followed by K 20 and XAN 112, respectively. The severity of the disease followed the same order over the three varieties. In the paired plant test, yields of diseased plants were generally lower than those of healthy plants over the three seasons, but not all differences were significant. The yield depression of diseased plants as compared to healthy ones ranged between 20 and 65%.

The results of this study show that CBB is associated with yield depression in beans in Uganda. The extent of the loss varies with the susceptibility of the variety, the stage of the crop and the season.

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