

EFFECTS OF MANAGEMENT PRACTICES ON BEAN PLANT
YIELD COMPONENTS IN UGANDA

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A large gap exists between the genetic yield potential of bean cultivars and yields commonly obtained. K20, the variety used in this study, has been recorded to yield 2500 kg/ha. Its genetic yield potential is probably well beyond this amount, but even in on station trials, yields typically range from 800-1500 kg/ha.

A series of three field trials were conducted at Kawanda Research Station in the second season of 1990 to study the effects of certain management practices on bean yield, and its components, in sole crop to better understand how higher yields can be attained. The factors and their levels were: plant population density--17, 20, and 23 plants per square meter; bean row spacing-- 30, 45, 60 cm; fertility level-- with and without 40-27-42 kg/ha of N-P-K; flower thrip control -- with and without 0.7 l/ha of Fenitrothion applications in early flowering to pod formation.

This report gives the highlights of this research, but the results are available in detail in the 1990 Annual Report of the Uganda Bean Programme. A summary of the results averaged over all row spacings and plant densities for low and high input conditions are presented in diagrams 1 & 2 of this report.

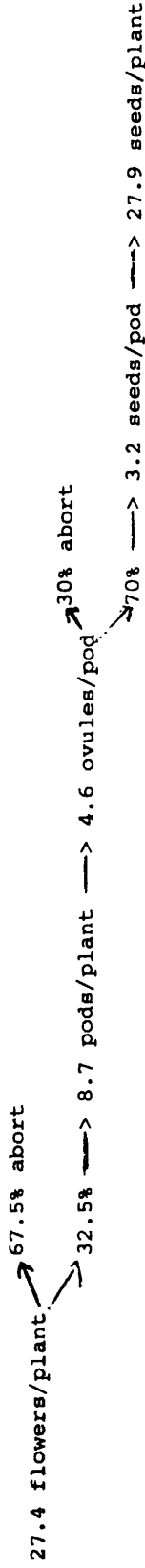
Use of fertilizer increased flowering and pods/plant, but it did not benefit seeds per pod. The overall effect was more seeds per plant with fertilization than under the low input conditions. Disease and flower thrip control resulted in more pods per plant. Seeds per pod were slightly less with disease control and more with thrip control. Both disease and thrip control resulted in an increase in seeds per plant. Seed weight per 100 seeds varied little and inconsistently from 38g due to treatment effects.

Flower number is probably much influenced by vegetative growth, and the effects of the applied fertilizer occurred at an earlier stage. Pods per plant were favored by higher soil fertility, but probably indirectly as improved soil fertility resulted in more flowers but did not affect the flower abortion rate. Ovule abortion was less with no fertilizer applied, possibly because of the greater pod number with the fertilized and insufficient nutrition or water to feed the extra ovules. Pods per plant and seeds per pod were more while ovule abortion was less at lower plant densities suggesting effects of competition for a limiting element. Row spacing had little effect on these characters suggesting that the element is mobile, i.e. a mobile nutrient or water.

The mean harvest index (HI) was higher at low (0.45) than high (0.40) fertility levels but under each set of conditions yield was negatively correlated to HI. At these yield levels, increased productivity requires that vegetative growth increase at a higher rate than seed yield. As this negative relationship of HI with yield is stronger at the higher soil fertility and yield levels, a higher yield level before HI may begin to increase. The results suggest that ideal conditions during the vegetative stage is more important to yield than during the reproductive stage.

27.4 flowers/plant → 67.5% abort → 32.5% → 8.7 pods/plant → 4.6 ovules/pod → 30% abort → 70% → 3.2 seeds/pod → 27.9 seeds/plant

Diag. 1. Reproductive development under low input conditions.



Diag. 2. Reproductive development under moderately high input conditions.

