TABLE I.

Bean Variety	Relative Yields lbs/acre @	% Protein on sample harvest	Gram methionine/ 100 gm. dry beans
Banja	850	21.0	0.20
Diacol Nima	1000	23.5	0.23
Kabanima	1250	26.0	0.26

@ average over several trials.

TABLE II.

Sources of high protein in dry seed for breeding

Variety	Protein % dry weight (Sample only)	Methionine as % of protein
Ocop 9x	28.9	0.9
Pronel	28.5	0.9
Cuarentino	29.5	1.0
Pop 412	31.2	1.0
Banja (for comparison)	21.0	1.05

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NEED ONE GROW PURE LINES IN DEVELOPING COUNTRIES?

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Throughout East Africa beans are grown by peasant farmers as varietal mixtures or land races. There has been a tendency for trained agriculturalists to assume that it is desirable to replace these with improved pure lines. Only recently is this becoming seriously questioned. One of the chief characteristics of the environment in East Africa is the great unreliability

both in quantity and distribution of rainfall. With early planting and a period of favourable soil moisture above the mean longer term varieties are advantageous. If farmers plant late, despite extension advice to the contrary, or the rains are short, early maturing varieties such as 'Banja' will be at an advantage. The incidence of diseases varies greatly from season to season, and different diseases are differentially favoured in different seasons. Thus genotype environment interactions tend to be very great and there is always a risk that any particular recommended pure line may meet an unfavourable environment. East African farmers probably have more wisdom than they have been given credit for in the past.

Though generally well adapted as a result of natural selection the mixtures in local land races are often of rather low yield potential. It is possible that the likely advantage of mixtures over pure lines in terms of yield stability and insurance against epidemics of any particular disease, could be exploited by the development of high yielding synthetic mixtures in which each component is both acceptable, palatable and high yielding but which vary in maturity and disease resistance characteristics. Such heterogeneous populations could either be developed by the bulking of early generation single plant selections following hybridization, with the subsequent elimination of genetic rubbish by roguing (complex blends in the sense of soy bean workers) or by the mixing of previously tested pure lines (simple blends) taking account of their 'combining ability in mixtures' (Leakey, in press in Agricultural Progress - Heterogeneous Agricultural Populations).

Experiments are in progress at Makerere University College to investigate the relative merits of pure lines and mixtures for release as new 'varieties' for peasant farmers. It is to be noted that considerations such as uniformity for mechanical planting and harvesting and the requirements of uniformity for a demanding market are irrelevant in the context of food crop improvement in a developing country such as Uganda.

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SPACING AND POPULATION DENSITY EFFECTS ON BUSH SNAP BEANS

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Bush snap bean yields ranged from about 8 to 15 tons per acre, with 50% of pods sieve size 4 and smaller, from a once-over hand harvest when plants were spaced 5 x 5 inches in 40-inch beds in 1968 and 1969. Yields were affected by planting dates, varieties and harvest dates. In 1968, yields from 8 and 9-inch rows, with plants spaced 2 to 3 inches apart in the row, were similar to yields of plants spaced at about 5 x 5 inches. Most plots were seeded with the 8-row Stanhay precision seeder and part of the fertilizer was banded at planting.

In hand-planted square spacings of 4 x 4 through 8 x 8 inches in 1966, 1967, and 1968, average yields for all years and varieties in tons