CAN DISEASES BE EFFECTIVELY CONTROLLED IN TRADITIONAL VARIETAL MIXTURES USING RESISTANT VARIETIES?

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Varietal mixtures of beans (Phaseolus vulgaris) dominate in many important bean growing regions of Africa , including the Great Lakes Region ,south eastern Tanzania, Malawi, north eastern Zambia, south western Uganda, and north west Cameroun. However, they are also found in subsistence farming systems in Ethiopia, and Kenya. The total extent of the use of varietal mixtures is only slowly unraveling as our understanding of Africa becomes clearer.

In regions where varietal mixtures predominate it is unlikely and probably undesirable to replace these time tested systems with simplified ones which use less genetic diversity. What strategy should be followed? In particular, from the pathology point of view,can resistant components be incorporated in mixtures to have an effect on the severity of disease in the traditional susceptible components? It is known from work on other crops that varietal mixtures can restrict the spread of disease considerably provided that the components differ in their susceptibility (Wolfe 1985). However, little is known as to what proportion a resistant variety must occupy in a mixture to reduce the overall disease severity and to protect susceptible varieties in the mixture. Two trials were carried out in Zaire to investigate this problem, each with various proportions of a variety (BAT 76) resistant to angular leaf spot (ALS) and a local farmers mixture.

The results of the first two trials are shown on tables 1 & 2. They indicate that the use of resistant varieties at low proportions of 25% in a traditional mixture can effectively protect susceptible components from diseases similar to angular leaf spot (table 1). This supports results by other workers such as Jeger et al (1981) However, when disease pressure was high as in the second trial, proportions of 10 and 20% resistance are not sufficient to adequately protect susceptible components (table 2). In such cases it may be that proportions of 40-60% of resistance as reported by Browning & Fry (1981), and Burton and Chivers, (1976), are needed to reduce the disease severity on susceptible components. Nevertheless, even under high disease pressure the farmer would have the security that the proportion of resistant varieties in the mixture will show less disease and should provide a harvest.

Table 1 Effect of 0,25,50,75, and 100% resistant varieties in a mixture on angular leaf spot severity and grain yield.

% resistance in mixture	SEVERITY % surface area infected				YIELD KG/HA	
	SUSCEPTIBLE (node 5)			GENERAL	EXPECTED	OBSERVED
	R6	R7/R8	R8/R9	R8/R9		
0	2,1a	6,3a	4,2a	14,0a	609	609b
25	2,0a	4,1b	2,4b	3,0b	645	658ab
75	1,7a	3,5b	2,5b	1,5b	717	777a
100	1,4a	1,8c	0,7c	1,5b	753	753a

Numbers with the same letter do not differ significantly (p=0,05)

Table 2 Effect of 0,10,20, and 100% of resistant varieties in a mixture on angular leaf spot severity.

% RESISTANCE IN MIXTURE	SEVERITY % surface area infected				
	ON SUCSEPTIBLE (node 5)			GENERAL	
	R6	R7/R8	R8/R9	R7/R8	R8/R9
0	0,8a	19,0a	20,4a	32,2a	37,5a
10	0,8a	19,0a	19,8a	27,2a	33,3a
20	0,9a	19,1a	20,0a	20,3a	29,2a
100	0,5a	5,1b	5,9a	11,3b	11,3b

Numbers with the same letter do not differ significantly (p=0.05)

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