

An analysis of factors associated with yields of climbing beans and Irish potatoes in the Northern Highlands of Rwanda

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Abstract

The physical and biological heterogeneity of the Northern Highlands of Rwanda has hampered the development and extension of new crop cultivars and new cultural practices for crop management as the performance of new cultivars and new technologies across diverse environments is not known. As cultivars and technologies are disseminated beyond the principal experiment stations there is the risk that their performance will be less than expected which could lead to farmer dissatisfaction and loss of confidence in researchers and extension agents. Prudence dictates, therefore, that the principal factors affecting performance be identified so that crop improvement and extension programs can direct their efforts towards factors impacting directly on yield from farm fields. The objective of the study therefore, was to determine which soil and site characteristics and disease factors are most closely associated with on-farm bean and potato yields. Soil, site and disease data from 26 farm fields over two seasons were regressed on bean and potato yields. Factors most closely related to yield of the bean cultivar, 'Mwirasi' were the interactions pH×bean fly severity, altitude×K, and *Ascochyta* leaf spot severity. Factors most closely related to yield of the bean cultivar 'G2333' were the interactions altitude × K, bean fly severity × K, % silt × K, and biomass of *Sesbania* and *Leucaena*. Both cultivars were susceptible to bean fly, but damage was mitigated by pH. Tuber yield of the potato cultivar, 'Cruza' was significantly associated with the terms, organic C×Mg, altitude × K, and altitude × % sand; whereas, yield of potato cultivar 'Sangema' was closely associated with the individual terms, altitude, insolation and *Sesbania* biomass. Both potato cultivars were susceptible to late blight and bacterial wilt, but neither disease emerged as a significant factor in the regression analysis because infection was homogeneous across sites. Data suggest that improved bean yield could be achieved by use of K fertilizers and resistance to bean fly and *Ascochyta* leaf spot. Tuber yield could be improved by resistance to late blight and bacterial wilt and addition of lime to increase Mg levels. Yields of 'G2333' and 'Sangema' were suppressed when grown in alleys of *Sesbania* and *Leucaena*.

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