Environment as a limiting factor of the range expansion of cultivated mungbean

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After being domesticated, the cultivation range of crops expanded to different agro-ecological zones. How did this crop globalization occur, and how did crops adapt to diverse natural environments? Using mungbean (*Vigna radiata* var. *radiata*) as a test case, we examined the factors shaping the expansion route of a crop. The Asian mungbean cultivars could be separated into four genetic groups associated with distinct geographic regions, including South Asia (SA), Southeast Asia (SEA), East Asia (EA), and Central Asia (CA). Despite the geographic proximity between Central and South Asia, we showed that after initial domestication in South Asia, the mungbean first expanded to Southeast Asia, then East Asia, and reached Central Asia the latest. We showed that environmental factors may be more important than geographical barriers, and local water availability and growing season length might be the critical factor limiting the direct expansion of South Asian cultivars into Central Asia. This hypothesis is supported by their phenotypes, suggesting distinct types of selection in regions of Asia, with artificial selection likely maximizing yield in the south and natural selection for environment adaptation in the north. The results suggested that human activities might not solely dictate the patterns of crop range expansion, and environmental adaptation might be important.