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RISK AND THE CHOICE OF CROPPING SYSTEMS : HYBRID SORGHUM AND COTTON IN THE AKOLA REGION OF CENTRAL PENINSULAR INDIA

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Risk and the Choice of Cropping Systems: Hybrid Sorghum and Cotton in the Akola Region of Central Peninsular India

T.S. Walker and K.V. Subba Rao*

Experimental evidence convincingly indicates that high yielding sorghum hybrids have greater yield stability than unimproved local varieties (Barah et al. 1980). Whether this conclusion applies to less protected and less fertile environments typical of many farmers' fields in the Semi Arid Tropics of India is an open and probably site specific question.

A more fundamental issue relates to the basis for comparisons on yield stability. Clearly, for rabi sorghum that is largely sole cropped on residual soil moisture in the postrainy season stability comparisons between improved and traditional cultivars are valid and thoroughly informative. But for sorghum hybrids planted in the rainy season stability evaluations that use local varieties as a yardstick do not tell the whole story. In the rainy season, local varieties are commonly planted in intercropping systems. They often are relatively minor components in those systems particularly in the black soil cotton growing regions of Maharashtra where sorghum hybrids are more widely diffused than in most other states in India. Although sorghum hybrids are eminently suitable for intercropping (Willey et al. 1981), farmers have steadfastly refused to plant them in their traditional and semi-improved intercropping systems. Most hybrid sorghum is sole cropped and managed more intensively than in competing intercropping systems.

The behavior of farmer suggests that they view sorghum hybrids and local varieties not as two different types of cultivars but rather as two different species. Sorghum hybrids have a high yield potential and harvest index and are short-statured, photoperiod insensitive, and early maturing. A contrasting set of adjectives describes local varieties. Sorghum hybrids and local varieties are readily differentiated in the market and fetch different prices for grain and fodder. When phenotypic change is so complete, risk analysis among alternative cropping systems may offer a more informative perspective on relative stability. Sorghum hybrids may be notably more stable than

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local varieties, but returns in sole-cropped hybrid sorghum may be markedly more variable than what is obtained in competing intercropping systems in which local sorghum occupies a proportionately small area and hence plays a minor role in conditioning revenue variability.

The economic stability of sole-cropped hybrid sorghum vis-a-vis two common intercropping systems in the Akola region of Maharashtra is the central theme of this paper. The study is based on farm-level data from Kanzara, one of the sites for the ICRISAT Village Level Studies (VLS). The VLS are conceptually described in Binswanger and Ryan (1980) and data collection instruments are documented in Binswanger and Jodha (1978). Agronomic and socioeconomic information is gathered from 30 cultivator and 10 landless labor households at approximately monthly intervals by a resident investigator in each village. For cropping systems analysis, the unit of observation is the plot, and we use field data over six cropping years from 1975-76 to 1980-81.

The study builds on and extends our descriptive research (Walker and Subba Rao 1982) on yields and net return distributions for the cropping systems most commonly practiced by farmers in the VLS. The technical and economic features of the common dryland rainy season cropping systems in Kanzara are discussed more thoroughly in that work, and some highlights are presented in Table 1.

A farmer with adequate resources in Kanzara can choose from four common dryland cropping systems for planting in the rainy season. These include two cotton intercropping systems, sole-cropped hybrid sorghum, and sole-cropped hybrid cotton. The most traditional and most common option (cotton intercrop 1) is to row intercrop desi or local cotton with pigeonpea and sorghum. A typical row ratio for the three crops is 12:2:1 local cotton dominates the system. Use of purchased inputs is minimal, and returns are low but extremely stable (Table 1). The second alternative (cotton intercropping 2) for the farmer is to invest more in this system by applying more purchased inputs particularly inorganic fertilizer, by planting with the more labor intensive 'dibbling method' for improved weed control, and by substituting more profitable cotton for local sorghum in the cropping system. Hybrid sorghum is another step towards commercial cropping, and it is more intensive in its demand for purchased inputs particularly pesticide and fertilizer.[1] Farmers spray hybrid sorghum in Kanzara to control stem borer and midge.

1. In years of abundant rainfall farmers sowing hybrid sorghum in the rainy season can plant a second crop in lower lying fields or in those that are located near wells. Dryland chickpea and irrigated wheat are the most popular choices for sequential cropping. About 30% of the area and plots planted to hybrid sorghum were cropped sequentially in Kanzara from 1975-76 to 1980-81. Because sequential cropping is less common and is restricted to site specific field conditions, we focus on the sole cropping of hybrid sorghum during the rainy season in this paper.