

Ethnic differences can make a difference in agriculture

By Carol J. Pierce Colfer, Barbara J. Newton and Herman Agus

Agricultural scientists, reasonably enough, concentrate their efforts on the nitty-gritty of agricultural experimentation, in most cases. But many are becoming increasingly interested in ways to ensure that their technologies, to which they've devoted so much energy, are adopted by people. The TropSoils/Indonesia project has used a "farming systems" approach to agricultural research and development as one way of trying to match agricultural technology to the people who will use it.

Although farming systems work has recognized the importance of matching technology to environments (often including the economic aspects of local conditions), there has been comparatively little recognition of the patterned human variation that can exist in one area. Over our three-year experience living in Sitiung, West Sumatra, conducting farming systems research on a soil-management project, this oversight became ever more glaring to us.

Sitiung is a 100,000-hectare area with acid soils (Ultisols, Oxisols and Inceptisols), and receives about 2500 mm of rainfall per year. The area is occupied by a mix of Javanese and Sundanese settlers (transmigrants) and the indigenous Minangkabau—virtually all farmers.

Residing as we did in the villages where we worked, differences in the agricultural practices and preferences among these groups of farmers became clear to the TropSoils team. Because such differences are important in the design of agricultural technologies, we conducted a quantitative study of people's different views of soil. The type of study we used is called a Galileo (Woelfel and Fink, 1981). The purpose of the Galileo was first to identify the "concepts" that people

relate to soil, and then to "map" them by having people judge the distances between concepts. We compared the cognitive maps of different ethnic groups, to see if there were significant differences.

Although there is not space for a complete discussion of our findings, some of the highlights can be presented here. Certainly the observable differences in the farming systems of the three groups were largely supported by the data we gathered. For instance, the important place of rice and rubber in the Minang systems showed up consistently. And Sundanese view a close association of men to vegetables, whereas the other ethnic groups viewed vegetables as a women's crop. The distance between each of 21 concepts and every other concept has been measured in three ethnic groups. We will focus on only two important findings here.

Distances between concepts differ importantly between ethnic groups

Although the plots in Figure 1 are distortions of the data, since they only represent two dimensions (out of a theoretical 21), they serve well to indicate the comparative distances between concepts for the three groups. The Minang have an average distance of 44, the Javanese, 30, and the Sundanese, 22. This difference appears to reflect two aspects of their farming systems.

The first relates to the degree of integration evident in their approach to agriculture. The transmigrants' systems are very integrated. For instance, cattle are kept on home gardens; manure can be applied to the

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gardens, which sometimes provide feed for the cattle. These systems are labor-intensive, and farming is the subsistence base around which the transmigrants organize their lives.

The Minang System is composed of quite separate components. Water buffalo are kept in a communal grazing area, and their manure is burned nightly to ward off mosquitos. Fruit trees are grown in separate orchards, or in the home garden. Wet rice fields are in another area, and the swidden fields (which are first cut for upland rice, then planted with rubber or rubber and coffee, and end as forest) are in yet another place. There is very little interaction among the components of the system, except insofar as they all feed into family subsistence in one way or another, and even that subsistence is supplemented wherever possible by non-agricultural work.

The second aspect of the respective systems relates to simple geographical dispersion. The Minang have practiced agriculture in a situation of minimal (if any) land scarcity. Until the transmigrants came, anyone needing land had access to it one way or another. Even now the Minang have access to considerably more land than transmigrants. The transmigrants are limited to 1.75 ha per family in Sitiung, and have recently moved from Java, where land is extremely scarce. One of our

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Figure 1.

Cognitive maps of three ethnic groups showing relationships of concepts related to soil. Plots are of the first two dimensions of rotated coordinates (from Colfer, Newton and Agus, 1987).





Studies by the authors underscore the importance of women in settlers' farming and gardening systems.

surveys found that half the respondents had been landless in Java, and the remainder reported having left very small holdings (in 10m² units). The Galileo distances inversely reflect population densities in the home areas of the three ethnic groups.

The labor-intensive systems of the transmigrants are clearly differentiated from the extensive farming strategy of the Minang

A number of the people's concepts (water, fertilizer, pests, yield, cultivation) are also important concepts for soil scientists conducting soil-management research. Table 1 shows these concepts paired with related concepts, to show the patterned difference in views of soil management, by ethnic group. The most glaring difference, not surprisingly, is between the Minang and the transmigrants. Only three of these concept pairs do not significantly differentiate the Minang from one of the transmigrant ethnic groups.

This kind of data can be used, in conjunction with soil-science considerations, to help determine research priorities. Someone interested in investigating the impacts of tillage on yields

Table 1. A measure of values relating to selected soil-management concepts at Sitiung, West Sumatra, 1985.

Good and	Minang (M)	Javanese (J)	Sundanese (S)
Water	JS 46	M25	M 24
Fertilizer	S 34	S 28	MJ 16
Pests	JS 68	MS 52	MJ 26
Yield	JS 61	M 26	M 27
Cultivation	JS 66	M 23	M 24

Note: The smaller the number, the more highly valued the concept. If there is a letter before the number, there is a significant difference between ethnic groups. For example, in the Minang column, the distance between "good" and "water" (46) is significantly greater than that perceived by Javanese (J) and by Sundanese (S).

might want to do a comparative study (as TropSoils did, on the basis of earlier observational findings by Wade, Agus and Colfer in 1985) with differing ethnic groups.

Three simple principles may make the utility of this kind of information more clear:

1. If the distance between two concepts is already close, persuading people to work on collaborative experimentation on these topics should be comparatively easy. The same notion applies to observational data. If people are already using a crop and are hoeing the soil prior to planting, they will more readily understand the goals of an experiment involving tillage on that crop.

Fertilizer is viewed as significantly closer to three of the four soil-management concepts by the transmigrants than by the Minang. Perhaps studies of fertilizer's interaction with these other soil-management concepts might most easily be carried out with transmigrants.

2. Conversely, if distances perceived by the farmers are great between two concepts (and scientists consider them close), this may be an opportunity for useful extension work. The fact that the Minang men perceive fertilizer as distant from themselves suggests an opportunity to increase fertilizer use—if indeed that is deemed desirable.

Those interested in increasing fertilizer use might want to consider some special effort devoted to women farmers of the Minang and Javanese ethnic groups, since they are active

farmers yet are perceived as far removed from fertilizer. Indeed, working with women as well as with men of all three groups in soil management is warranted by these data (and others): Note the similarities in the distances between the sexes and the others of these concepts.

3. Lastly, indigenous farmers' perceptions of great distances, vis-à-vis scientists' perceptions, should also strike a warning bell. It may well be that the farmers' longer experience in that environment has taught them things that the scientists can use and build on. The low-level management possible with the Minang system, which relies on a mix of food crops and tree crops, has many apparent advantages. But as population densities increase, creating the necessity to either shorten the swidden cycle or intensify production on each field, the Minang system will require scientific research to remain feasible.

References

- Wade, Mike, Fahmuddin Agus, and C. J. P. Colfer. "The Contribution of Farmer-Managed Research in Technology Development." Paper presented at the International Workshop on Farming Systems Research, Sukarnami Agricultural Research Institute, West Sumatra (10-13 December, 1985).

- Woelfel, J.D. and E.L. Fink. *Science and Human Communications: A Theory of Cultural Processes*. New York: Academic Press, 1981.