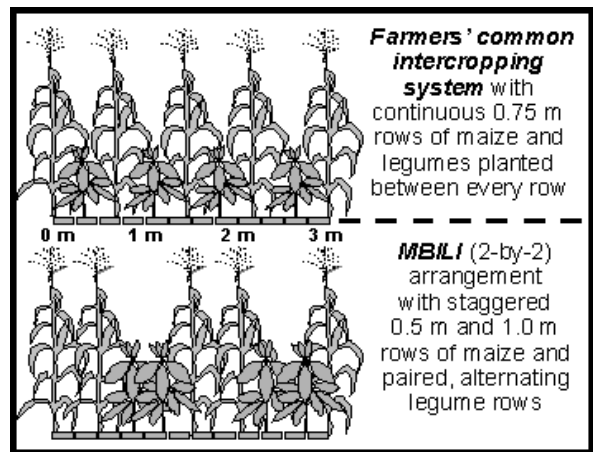


Managing Beneficial Interactions in Legume Intercrops (MBILI)

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Background. SACRED Africa has obtained an additional grant to continue its attempts to improve upon the maize-legume intercrop in ways that can be quickly adopted by farmers. This project is titled Managing Beneficial Interactions in Legume Intercrops (MBILI), which aims at improving yields and returns of the legumes grown with maize. The basic approach is to stagger the rows of maize, allowing for better light and soil conditions within the understory legumes while continuing to maintain the same plant



populations (see diagram, right). The first round of field work was conducted during the "second" growing season (October 1999 to February 2000) at seven farms in Bungoma and examined the effects of row arrangement, choice of legume crop and the addition of DAP fertilizer. The growing season was marked by lower than expected rains causing moderate mid-season drought. The study indicated that planting in the MBILI arrangement can improve legume yield and total crop value by 12% without requiring additional investment by farmers or reducing the yield of maize. Legumes that require more sunlight, such as green gram and groundnut, performed particularly well when planted using MBILI. Farmers found it easier to weed and top-dress the legumes but also discovered that poor legume seedling emergence could result in larger "gaps" in their fields. The greatest economic return resulted from groundnut intercropped in the MBILI arrangement with addition of 150 kg DAP per ha (KSh/74,118), partly because the prices for groundnut were very high that season.

The past season. The second round of field experiments was conducted between June and October 2000 on four farms in Bungoma. This experiment compared conventional and MBILI intercrops of beans, green gram and groundnut with and without 150 kg DAP per ha. Also included as treatments were maize and legume monocrops, which allowed us to not only compare the two intercrop systems, but to also calculate the overall advantages of intercropping. The season's rains were favourable, although the field trials were planted late in the season. Maize yields were better during the second experiment (1437 kg per ha) with increase of 530 kg compared to the previous season. Maize grown under the MBILI row arrangement performed slightly better (+158 kg per ha) than conventional intercropping. The conventional maize-bean intercrop without addition of DAP produced 775 kg of beans and 1196 kg of maize per ha, which were valued at KSh/32,600 (see table, top of next page). Shifting to MBILI row arrangement increased crop value to KSh/35,800 and combining MBILI and DAP fertilizer (costing KSh/4200) resulted in a maize-bean intercrop worth KSh/46,900, and increase of 44%!

Green gram and groundnut performed even better in the MBILI planting arrangement than beans. Groundnut yield improved by over 110% using the MBILI strategy and when DAP was applied the total crop value was increased by 120% to KSh/57,100 per ha. The highest crop returns were with green gram because its yields were substantially improved in the MBILI system and its price remained very high through the end of the season. The best system was green gram intercropped with maize in the MBILI arrangement and fertilized with 150 kg DAP per ha. This cropping strategy produced 1384 kg of green gram and 1800 kg of maize per ha that was worth KSh/73,200 at season's end! Shifting from an unfertilized maize-bean intercrop to a fertilized maize-green gram MBILI arrangement resulted in greater yields worth an additional KSh/40,600 per ha and required only a modest additional investment of less than KSh/5000 per ha!

Some results from MBILI's past season field trials conducted on four farms in Bungoma, Kenya.

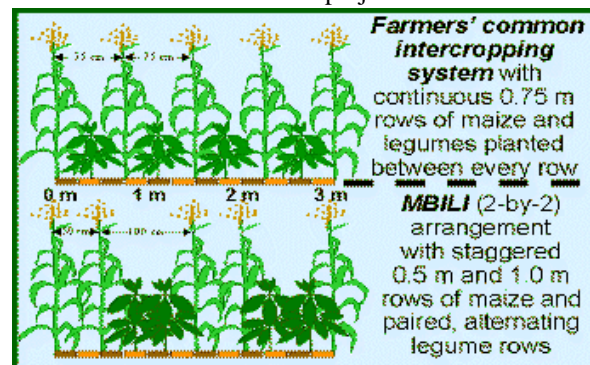
Cropping strategy	legume yield	maize yield	total crop value
	---- kg per ha ----		KSh per ha
bean monocrop without fertilizer	930	n.a.	20,700
maize-bean intercrop without fertilizer	775	1196	32,600
MBILI maize-bean without fertilizer	878	1264	35,800
MBILI maize-bean with DAP	1150	1640	46,900

MBILI maize-bean with DAP	1152	1640	46,900
MBILI maize-groundnut with DAP	743	1706	57,100
MBILI maize-green gram with DAP	1319	1800	73,200

What next? SACRED Africa and its cooperators are very excited about the prospects on MBILI but at the same time we must be cautious in how these results are interpreted. In many cases, even modest investment is difficult for farmers and we should find ways to help farmers to evaluate MBILI on part of their land. Much of MBILI's economic advantage rests in the farmer's ability to grow higher value legumes such as groundnut and green gram, and if the supply of these legumes were to rapidly increase, their prices would likely drop. Also, the MBILI approach may not out-perform conventional intercrops where maize yields are very high, because its advantage of providing more light to understorey legumes becomes less as maize growth potential increases. The real test of the MBILI approach rests in its large-scale evaluation by farmers, and their willingness to adjust their cropping practices in terms of row arrangement and legume intercrop, and this important evaluation will be a major objective of SACRED Africa and its cooperators over the next two years. This work will begin in March and is made possible through a grant provided by The Rockefeller Foundation.

Already we have made several important findings and we encourage others to test this promising new technology as well. Too many other "breakthroughs" require that farmers commit excessive investments of their scarce labor or finances, and despite being technically feasible, they actually offer little practical advantage to farmers. We maintain that MBILI does not fall into this category because it begins with the farmer's main enterprise, the maize-legume intercrop, and requires neither additional labour nor investment when practised in its simplest form. We have demonstrated that the MBILI planting arrangement can result in higher yields, considerable economic gain and more efficient use of land area. Maize-legume intercropping is widely practised by farmers because they know it offers higher returns and less risk. Our studies indicate that conventional intercropping makes 67% better use of the land than growing maize and legumes separately as monocrops. Shifting that intercrop system to MBILI results in an additional 40% land use efficiency, an improvement that can make a huge difference in smallholders' food security. Even without additional investment, by holding legume intercrop and fertilizer inputs constant, MBILI results in an overall gain of KSh/8,800 per ha, income that can help meet farm families' hopes and expectations for a better life.

MBILI was recently demonstrated to over 600 farmers and many officials from the Ministry of Agriculture at the Bungoma Farmers Training Centre and the response by most observers was quite favourable. Several farmers asked "*this seems almost too good to be true, why were we not shown this technology before?*". Farmers are quick to understand the basics of this technology, and often relate to MBILI's staggered row intercrop as "two-by-two", an interesting play on words considering that the acronym MBILI is also the *Kiswahili* word for the number "two" (*mbili*). If you have further questions about in the MBILI approach, or wish to include it within your farm, community development or research activities, please contact SACRED Africa for more information about the MBILI project.



Try the MBILI approach to maize-legume intercropping for higher yields, easier management, more efficient land use and greater return to inputs!

On-farm studies in Bungoma show that MBILI results in ...

- ☑ 22% more legume seed and 12% more maize grain
- ☑ easier weeding and application of mid-season fertilizers
- ☑ 40% more efficient land use than conventional intercrops

8% more efficient use of DAP fertilizer

**For more information on MBILI, contact SACRED Africa,
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