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## Cowpea: Living Mulch under Maize

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*EDN 122 highlighted multi-purpose cowpea varieties with spreading vines that cover the soil. Below is an ECHO research update from South Africa relating our experience so far with a spreading cowpea variety intercropped with maize grown in a Foundations for Farming (FFF) system.*

“Living carpet” and “green manure/cover crop”—these are terms used to describe the practice of maintaining a plant-based mulch to protect and enhance the soil. But why bother to intercrop maize with a legume if the maize plants will shade the ground soon enough? First, plant growth is influenced by soil temperature. Maize, for example, has optimal root growth between 23-25°C (Brady and Weil, 2008). Soil temperatures above 26°C restrict root and shoot growth of maize seedlings (Walker, 1969). In the warm tropics, therefore, the cooling effect of an early-season “living carpet” would be beneficial to maize. Secondly, leaf litter from the legume crop decomposes over time, resulting in an organic mulch layer that conserves soil moisture (Lal, 1995) and enhances nutrient retention and microbial life. Legume rotations are now being widely promoted throughout Africa in attempt to reverse the rapid decline of biological activity and soil organic matter (Sileshi, 2008). Lastly, cowpea grown with maize helps suppress weeds and provides the farmer with a food source (dry beans) before maize harvest.

In an ongoing FFF trial, rows of a creeping cowpea variety (IT98D-1399) were alternated with rows of maize. The FFF-style planting stations (basins 15 cm deep) were dug 60 cm apart within rows, with 50 cm between the rows. [NOTE: recommended FFF spacing calls for 75 cm between rows of planting stations; for purposes of this trial, we reduced the between-row spacing to 50 cm so that, with alternating maize/ cowpea rows, there would only be 1 m instead of 1.5 m between rows of maize.] Cattle manure was placed in the planting stations (500 ml of manure/station) at the end of August, during the winter dry season. Maize and cowpea were planted on 22 November 2013, as soon as there was enough rain. The maize planting stations received a micro-dosed (5 grams per station) side-dressing of NPK (12% nitrogen; 9% phosphorus; 12% potassium) fertilizer on 15 Jan 2014.

By the 6th week after seeding the maize, the cowpea canopy was 50 cm wide, corresponding to 50% soil coverage. Two weeks later, cowpea had completely covered the soil with the canopy width ranging from 97 to 111 cm. At 10 weeks after seeding maize, the cowpea canopy showed a noticeable cooling effect on the

soil; soil temperature (at 7 cm depth) decreased from 35°C with maize alone to 30°C with maize/cowpea. By maize tasseling stage (nearly 12 weeks after planting), the cowpea vines had begun to produce harvestable pods (Figure 4).

Some concerns to keep in mind when deciding whether or not to incorporate a green manure into your cropping system include moisture competition, nutrient competition, and potential yield reduction. Our results to date indicate no competitive effect of cowpea with maize. Maize plant height did not vary between plots planted with and without cowpea. Yield results have yet to be collected, so it will be interesting to see how the cowpea understory affects the maize yields. These results hold promising potential for incorporating cowpea into a FFF maize field.

Green manure cover crops can be incorporated into your growing system in many ways. Another technique we are trying in South Africa is to combine cowpea with a longer-duration legume (*Lablab purpureus*) to extend the time over which the soil is covered. Other legumes to try include velvet bean (*Mucuna pruriens*), jackbean (*Canavalia ensiformis*), horsegram (*Macrotyloma uniflorum*), pigeon pea (*Cajanus cajan*), and tephrosia (*Tephrosia vogelii* or *T. candida*). Perhaps cowpea or another legume could be integrated into small-scale cropping systems in your area, enhancing the health of farmers' soils and increasing their crop production. Small-plot experimentation is suggested to make sure that the legume plants do not compete strongly with the main crop.

ECHO's seed bank offers seeds of a variety of legumes, as well as spreading-type cowpea varieties ('Samoeng' from Asia and 'Mavuno' from Tanzania; see EDN 122 for short descriptions) and a more bushy variety from ILCA (International Livestock Center for Africa). Visit [www.ECHOcommunity.org](http://www.ECHOcommunity.org) (<http://www.echocommunity.org/>) for information on how to order trial packets of seeds. Our bookstore ([www.ECHObooks.org](http://www.ECHObooks.org)) also carries *Restoring the Soil*, a book authored by Roland Bunch with a wealth of information on green/manure cover cropping systems.

#### References:

Brady, Nyle C., and Weil, Ray R. 2008. *The Nature and Properties of Soils*. 14th edition. Pearson Education Inc.

Lal, Rattan. 1995. *Tillage Systems in the Tropics: Management Options and Sustainability Implications*. 71st ed. Rome: FAO Soils Bulletin. Google Books. FAO 1995. Web. 21 Mar. 2014.



Figure 4. Maize at tasseling stage with a cowpea understory. Photo by Tim Motis,

Sileshi, G., 2008. *The excess-zero problem in soil animal count data and choice of models for statistical inference*. Pedobiologia 52, 1-17.

Walker, J.M. 1969. *One degree increments in soil temperatures affect maize seedling behaviour*. Proc. Soc. Soil Sci. Am. 33, 729-736.