Cotton Production and Kwashiorkor
Could Organic Cotton Bring Back an Available Source of Protein?
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Introduction
Kwashiorkor, malnutrition caused by a lack of any of the essential amino acids in the diet, affects many people in Africa. Kwashiorkor mainly affects children, especially after weaning. The people of the village of Sanambele, Mali have identified kwashiorkor as their second major constraint (after malaria) to achieving their desired goals. In 2013, the health center of Sanambele identified 23% of the 0 to 3 year old village children either at-risk or for with kwashiorkor. Those of the team who lived there noticed the children’s typical diet was missing essential amino acids tryptophan and lysine. Some of the best sources for tryptophan produced in the village are red meat, dairy products, bananas, soybeans, and nuts. Sanambele is located in West Africa, one of the top cotton producers in Africa. Cotton production in Mali has declined recently because of the high cost of inputs and low yields and price of cotton. According to Keriba, it was discouraging for the farmers to put so much effort and receive so little in return (Coulibaly 2011). The main pest Sanambele farmers deal with in their cotton crops is the cotton bollworm and is the most problematic during the larval stage when it feeds on the reproductive structures of the cotton plant. The main method of dealing with the pests is the use of pesticides. Since many of the crops grown by the Sanambele farmers are grown for food, cotton is an important crop because it can be exported into the world market and the farmers receive money. Even with the high cost of the inputs, cotton production is still a major part of the Mali economy and a possible cause for an increase in the number of children that are affected by kwashiorkor.

Hypothesis
A crop associated barrier strip around the cotton fields will reduce the amount of pest damage in Sanambele, Mali and increase income off of their crops. Cotton production in Sanambele has declined recently because of the high cost of inputs and low yields and price of cotton. According to Keriba, it was discouraging for the farmers to put so much effort and receive so little in return (Coulibaly 2011). The main pest Sanambele farmers deal with in their cotton crops is the cotton bollworm and is the most problematic during the larval stage when it feeds on the reproductive structures of the cotton plant. The main method of dealing with the pests is the use of pesticides. Since many of the crops grown by the Sanambele farmers are grown for food, cotton is an important crop because it can be exported into the world market and the farmers receive money. Even with the high cost of the inputs, cotton production is still a major part of the Mali economy and a possible cause for an increase in the number of children that are affected by kwashiorkor.

Methods
• Interview peer reviewed article research exploring cotton production, pests that infest cotton crops, Mali, grasshoppers, and nutritional properties of the grasshoppers, with the search engine AGRIC Direct.
• Keriba Coulibaly, a scientist of L’Institut d’Economie Rurale Sikasso, Mali, has regular correspondence with the Sanambele farmers and has exchanged several emails over the same period.
• The authors of the AGSC 465R course readings and various internet websites provided valuable information about cotton, grasshoppers, holistic goals, and how others have addressed problems in Africa.

Results
There has been a recent decline in cotton production in Sanambele because a high cost of inputs and low yields and price of cotton. According to Keriba, it was discouraging for the farmers to put so much effort and receive so little in return (Coulibaly 2011). The main pest Sanambele farmers deal with in their cotton crops is the cotton bollworm and is the most problematic during the larval stage when it feeds on the reproductive structures of the cotton plant. The main method of dealing with the pests is the use of pesticides. Since many of the crops grown by the Sanambele farmers are grown for food, cotton is an important crop because it can be exported into the world market and the farmers receive money. Even with the high cost of the inputs, cotton production is still a major part of the Mali economy and a possible cause for an increase in the number of children that are affected by kwashiorkor.

Discussion and Conclusion
Cotton is an important resource and is important for farmers to grow a large and healthy crop. Regular use of pesticides pests are developing a resistance (Martin et al 2005) and polluting the grasshoppers as a snack food and source of protein. Grasshoppers are very good sources of protein, around 20-25 grams of protein for medium to large insects. The children of the village of Sanambele eat large amounts of protein in their diet (Fejes 2009). A crop associated barrier strip would reduce pests in the cotton, pesticides would decrease and an excellent protein source would be available to the children. Some organic cotton production is already used parts of Mali and has been grown successfully.

Cotton production in Sanambele has all of the necessary resources to stop kwashiorkor from being a problem. However, with their current traditional and management practices, kwashiorkor is a real threat. The villagers do not need to lose their traditions to fix this problem and all that is needed is a shift on the management techniques that could help control pest load but not cause harm, or on the processes of growing cotton to reduce the use of pesticides. With some outside help to point them in the right direction, the villagers could solve the problem on their own way.

Recommendations
• Use meter square plots testing different crop associated barrier strips. With a successful barrier the need for pesticides would be reduced and the children would be able to eat grasshoppers again.
• Shift time children eat grasshoppers to the time before pesticides are needed.
• Different insect for a protein snack such as ants. Using a sticky trap of honey or sugar would be effective in catching them in quantities that could be useful.
• Lengthening the time of breastfeeding. A method of birth control would need to be available to ensure the proper length of breast feeding time.
• Raising a herd of goats and cattle for the children to eat would provide a source of protein. This idea has already been talked about by the Women’s Association.

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Literature Cited