Organic Protection of Cowpeas Postharvest Against Callosobruchus maculatus (F.) Using Shea Butter

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INTRODUCTION
Preserving nutritional value of local traditional foods for native children from harvest to harvest is vital to their health and development. Traditionally, Malian children receive vegetables and grain as main part of their daily diet, while male adults are given meat. Cowpeas are part of the diet of West African village children, but in many villages only eaten during 2 to 3 months after harvest because they are considered too difficult to prevent from destruction by cowpea bruchids, Callosobruchus maculatus, bruchids spending entire larval and pupal stages inside cowpeas. This beetle species eats only cowpeas. Adult stage does not eat at all. Cowpeas, widely grown in West Africa, offer extra lysine, an essential amino acid lacking in the native children’s diet of millet, sorghum and maize. Lysine offers more growth, mental and physical development in children. Lysine along with tryptophane, found in milk and grasshoppers (typical children’s snack), will prevent kwashiorkor (top – note reddish hair) and at-risk for kwashiorkor (bottom – in green and white dress). Figure 6. Sanambele child with kwashiorkor (top - note reddish hair) and at-risk for kwashiorkor. Aerina Alvarado and Dr. Florence Dunkel weighing 50 g of cowpeas for bioassays. Figure 4.

Hypothesis
Since shea butter is locally made by women from village shea trees, we hypothesized shea butter is a good candidate for organic protection of cowpeas against its main storage pest, C. maculatus.

MATERIALS/CONDITIONS FOR INSECT STOCK CULTURE
150 organic cowpeas from Community Food Coop-Montana
• organic shea butter from Sanambele’s Women Shea Butter Coop
• 20 half pint mason jars with 50g organic cowpeas (wet weight)

MATERIALS/CONDITIONS FOR INSECT STOCK CULTURE

RESULTS
Shea butter prevented C. maculatus from entering the cowpeas as a hatching. C. maculatus laid 50% less eggs on treated cowpeas compared to controls, but embryos did not reach full development. Cowpeas were not nutritionally destroyed by C. maculatus when coated by 1g shea butter per 50 cowpeas.

Figure 2. C. maculatus and hatched egg

PICTURE CREDIT
Figure 1. Uninfested Cowpeas, Vigna unguiculata

DISCUSSION
Why will adoption of shea butter to preserve cowpeas from harvest to harvest be easy for village women?
Shea nuts are owned by village women. Shea butter is locally made from the nuts in the villages by West African women. Since it is an organic material, a butter made by village women from the nut of the shea tree, shea butter will have a chance to be adopted. Villagers do not like using unknown technology. Plus, shea butter is already used for cooking cowpeas.

Figure 5. Ashley Alvarado and Dr. Florence Dunkel holding container of shea butter.

What will this mean for the children of Sanambele and other villages where at least one-fourth or more of the kids are at risk for kwashiorkor?
Organic protection of cowpeas, against their main storage pest, C. maculatus, will allow cowpeas to be preserved harvest to harvest. This means that the children who are at risk for kwashiorkor can lower their risk by eating cowpeas year-round. Along with a glass of milk (providing the amino acid, tryptophane, missing in cowpeas), this will prevent kwashiorkor.

Organic farmers or persons looking for a solution to similar safe, protection method for cowpeas in Malian villages, and throughout African Guinea where shea trees grow and cowpeas are eaten.

Figure 7. Changing the record chart for the 7-day, continuous recording thermo-hydrograph in the environmental chamber where both mass cultures of bruchid beetles are kept and the bioassays are conducted.

CONCLUSIONS
As long as cowpeas are protected against C. maculatus, native villagers may safely store cowpeas and serve them, from harvest to harvest, to their children to prevent kwashiorkor. Shea butter is a local, “at-home”, no-cost, safe, protection method for cowpeas in Malian villages, and throughout Sub-Saharan Africa where shea trees grow and cowpeas are eaten.

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REFERENCES


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