



NMSU professor and researcher Charles Martin holding a yerba mansa root at New Mexico State University's Sustainable Agriculture Science Center in Alcalde, N.M.

Martin has made yerba mansa a viable agricultural crop for New Mexico's small farmers. Though the herb is relatively unknown outside of the Southwest, experts in the industry say yerba mansa could become as popular as other medicinal herbs including golden-seal and Echinacea.



People have inhabited New Mexico for thousands of years, long before McDonald's, microwave ovens and even grocery stores. What would it take to live that way again?



This is another innovative research project based at the **Santa Fe Complex**. Santa Fe Complex is a hive of activity ranging from the projects of our affiliates to a variety of public events on a wide-ranging array of topics loosely related to science, technology, art and modern life. Our educational mission is woven through these activities as we work to expand awareness of the benefits of collaborative project spaces and teach students young and old about the tools being developed to visualize and model complex phenomena and environments.

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**We are seeking curious students interested in investigating this topic. Energy and commitment are much more important than experience.**

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**Getting enough to eat today?**

**How about tomorrow?**



**Super-Computing Challenge Project:**

**Simulation models for small-scale, sustainable agriculture.**

## ...and when the grocery store shelves are bare?

When Hurricanes Gustav and Ike hit Cuba in mid-September they destroyed tons of food growing in the countryside, food that will never



reach the 75% of Cuba's population living in cities. With winter approaching and shortening the growing season even in the Caribbean, the Cuban government called for rapid action in urban areas to plant "short-cycle crops" to "ensure food as soon as possible."

A newspaper story in central Cuba reported:

*The increase in urban citizens who know organic gardening now stands among the alternatives in Cuba that has to stimulate the production of agricultural food after the disaster caused by Hurricanes Gustav and Ike....*

*This experiment, begun two decades ago as a complement to food production, is now considered a pattern for several measures under consideration and aimed at reviving traditional agriculture.*

*Maria del Carmen Perez, acting minister of agriculture, stressed the advantages of this mode [of food production] where the potential labor force [are those who consume the food]....*

*Each province is working at rescuing products toppled by strong winds, and each territory is making progress in planting short-cycle crops to ensure food as soon as possible. Such a strategy will promote the ready availability of potatoes, corn, beans, squash, cucumbers and vegetables in a relatively short time.*



Natural disasters like Cuba's or those on the U.S. Gulf Coast are occurring with increasing frequency and, it seems, vigor. But hurricanes are just one example. What will happen if disease hits the mono-crops of our Great Plains, wiping out a season's wheat or corn production? Perhaps a fungus hits the chili crop in Hatch, taking away not just the economic value to that region, but also the nutritional value.

As the mono-crop scale of American agricultural has grown, so does crop vulnerability. And if, given the price of fuel, we cannot import food from other parts of the U.S. or the world, how do we eat?

Under highly variable conditions like this, how can we know what are the best crops to plant and where?

Should the food be stored locally or quickly distributed around the nation?

### We propose:

To build a NetLogo model(s) illustrating the possibilities of small-area farming, a generic optimization model that could be loaded with data relative to conditions anywhere in the world. This work is inspired by the work already being done in Cuba's cities and by our intent to participate in some Applied Complexity workshops in Camagüey, Cuba in February 2009.

### Objectives:

- Possibilities for optimization:
  - Maximum production
  - Most efficient production
  - Most efficient distribution
- Resource cost compared to importing food (from rural area or over distance). i.e. centralization or decentralization of production/distribution
- Balance between labor force and consumption and possibility of creating jobs
- Production of healthiest foods
- Use of methods with minimal environmental impact
- Which has greater utility, mono crops or multiple, simultaneous plantings or variations of both relative to growing season? What are leading factors impacting this question?
- How does one best coordinate acquisition of needed resources before planting and distribution of crop at harvest?
- Relative importance of storage and distribution infrastructure?