

SA #29	ECONOMIC BOTANY
	Stern, Chapter 14 (part)

TRANSITION: In **Ecology** we have learned the value of plants and other autotrophs in the **Economy** of Creation’s ecosystems – i.e. ecosystem services. Some of these services have been assigned value by the marketplace (e.g. food, fiber, fragrances, forest products, drugs) and, hence, fall into the domain of the **economy** (little “e”). In both “economies” humans are exercising stewardship (good or bad) when they assign value to plants and plant products. This assignment highlights food crops and considerations related to their domestication and the preservation of valuable genetic varieties. We will also consider the importance of seeds to humanity and to the great commission via a missionary support network known as “ECHO.”

ECONOMIC BOTANY READINGS – According to the following topics:

1. **Plant Germplasm and Agriculture:** Stern, Ch. 14, pages 254-256 to answer the following questions:
 - a. How is the secular humanistic/naturalistic view of the origin of agriculture different from that presented in Scripture (Genesis 1-3, *etc.*).
 - b. What crop plants provide 80% of the calories consumed by humans worldwide? Give their rank in the table below along with “Place of Origin” (see Figure 14.2).
 - c. What was Vavilov’s contribution? Was he correct? What was his motivation? His fate?

2. **Valuing Seeds - A testimony:** Read “The Gift of Commitment” (Attached) and answer the following:
 - a. Were the sacrifices of the Russians justified? Why is seed (germplasm) preservation important?
 - b. Who should "own" (patents to) new crop varieties? (*e.g.* biotech firm or country of genetic origin?)
 - c. What value is currently being placed on the Vavilov collection? Go to [“Putin Threat”](#)

NAME	Place of Origin	Rank as Food Source (Tons)	Can it or its seeds be planted?	Is it a fruit or a vegetable?
1. Potato				
2. Black Walnut				
3. Pinto Bean				
4. Winter Squash				
5. Oats				
6. Concord Grapes				
7. Coffee				
8. Corn				
9. Carrots				
10. Lima Beans				
11. Cabbage				
12. Orange				
13. Wheat				
14. Tomato				
15. Blueberry				
16. Rice				
17. Peanuts				
18. Soybeans				
19. Sweet Potato				
20. Cassava				
21. Cranberry				
22. Apple				

THE GIFT OF COMMITMENT*

To anyone who works to preserve genetic diversity, a visit to the Vavilov Institute in Leningrad is a pilgrimage. We arrived at our hotel in the early hours of a cool July evening in 1985. Not stopping to unpack, we threw our bags into the room and headed back down to the lobby, where an old doorman who spoke only Russian finally understood our pronunciation of "Vavilov." He pointed across the square in the direction of a large three-storey building. The offices were closed for the day and everyone had gone home, but there were flowers and exotic plants in the windows and we found a simple plaque commemorating Vavilov. This was the Vavilov Institute.

We had come for meetings with the director and staff of the institute, but as we walked through the front door and were confronted with a bust of Vavilov at the top of a staircase, business travel gave way to awe. At the base of the bust, staff members place flowers daily. The history of the place is very much alive. You cannot help but feel it.

The institute was preparing for the 1987 centenary of Vavilov's birth, when it would celebrate not only that event but its own history. It was from this institute that the first large-scale plant collections were launched. Vavilov and his associates searched the world for its crop diversity and brought back seeds to be stored in this building. Here Vavilov developed his theory of the centers of origin of agricultural crops, and the law of homologous series. And here is where he finished his career, a victim of Lysenkoism and ultimately a martyr for genetics.

Today his office looks much as it did the last time he left it in 1940: simple and practical. A big desk, overstuffed chairs, and some bookcases crammed with reports, old scientific instruments, and photographs from his many collecting expeditions. We found cytogeneticist Dr. Nina Tchuvashina leafing through some notebooks, preparing a history for the 1987 festivities. Our conversation, slowed by the necessity of going through an interpreter, turned to the Siege of Leningrad. The heroics of the people of Leningrad, surrounded and bombarded steadily by the Nazis for nine hundred days, are well-known. Less well-known is the story of the institute during the siege.

As the war began, institute scientists started to make duplicates of the 180,000-accession collection. Especially vulnerable was the potato collection, kept not as seed but as potatoes. Sub-zero temperatures would freeze them in the winter. Rats were a year-round threat. In the spring of

1942 the potatoes began to germinate, forcing scientists to plant them in the only place they had—in fields along the front. A valuable collection of blight-resistant potatoes made by Vavilov in Chile needed short days to mature and so was shielded from the sun by crude "cabins" constructed by the staff. By August, with the invaders near and the city in flames, institute staff began digging up the potatoes as shells hit the fields. Amazingly, they retrieved all the samples. During the winter as scientists were evacuated, they smuggled out potatoes sewn into pockets next to their bodies, so that the potatoes wouldn't freeze. All blight-resistant potatoes in the USSR today are descended from these potatoes.

The blockade of the city was forcing people to eat dogs, cats, rats, and even grass to stave off hunger. Over six hundred thousand people were to starve to death before the siege ended. Inside the institute, the rats had learned how to knock metal boxes full of seeds off the shelves in order to break them open. Guards were posted to protect the seeds from rats, and on the roof scientists took turns watching for fires caused by the shelling.

After the evacuation in 1942, thirty-one people were left at the institute. They were given a daily ration of 120 grams of bread (less than a quarter of a loaf of American bread). Fourteen died of starvation in December.

Dr. Tchuvashina brought out a scrapbook of photographs of these people and we sat around a table in Vavilov's outer office to look through it. There was Dr. Dmytry S. Ivanov, the rice specialist, who died at his desk surrounded by bags of rice. Dr. Rubtzov, a fruit breeder. As she leafed through the photographs, Dr. Tchuvashina paused over one; she said something to the interpreter who smiled and gave a short reply, before she turned to the next page. We asked the interpreter what she had said. She had asked him if he knew Dr. Geynts, the institute's librarian, now in his sixties. Yes, he did. The photograph was of Geynts' father—one of the men who had died of starvation in this building. We went on. Dr. Kreyer, a specialist in medicinal plants. Professor Molyboga, the meteorologist. . .

Why? Why would these people starve to death surrounded by so much food? Dr. Tchuvashina looked

at. us as if we must already know the answer-they were students of Vavilov. But what did they think they were doing saving all these seeds? What did they say to themselves as they slowly and collectively starved in this big old building? Dr. Tchuvashina reminded us that these scientists knew the value of genetic resources. Vavilov had taught them that. From where they were it looked as if humanity was destroying itself. Someday it would need these seeds. "When all the world is in the flames of war, we will keep this collection for the future of all people." This was what they were telling each other, she said.

We had no reply. We could only nod and thank her. As we walked across the square towards the hotel, our thoughts were on the sacrifices Vavilov and these scientists had made. Over four decades have passed since then. Plenty of time for us to learn to appreciate what these people gave their lives to save.

We have seen that appreciation in practice in Nicaragua. We have seen it at work in Ethiopia, where the government is preserving traditional varieties in anticipation of future droughts. We have talked with Thai farmers who insist on planting their native varieties of rice. We have even witnessed it in the rise of small companies and nonprofit organizations in North America, dedicated to promoting heirloom vegetable and fruit varieties. And we have watched this appreciation at work in the halls of the UN Food and Agriculture Organization as Third World ambassadors pursue agreements over germplasm exchange and the creation of an international gene fund.

Today we are not called upon to give our lives as the brave scientists at the Vavilov Institute did. We are not even required to be scientists or ambassadors, for remember it was the "amateurs" who domesticated our food crops and helped create diversity. Instead we are called upon to help preserve the diversity handed down to us. Whether we be scientists or politicians, farmers or factory workers, gardeners or teachers, we each have a special role to play in passing this gift on to the next generation. The manner in which we meet this challenge will largely determine how- or whether-future generations will live on this planet. "One thing is certain," writes Bentley Glass. "We cannot turn the clock back. We cannot regain the Garden of Eden or recapture our lost innocence. From now on we are responsible for the welfare of all living things, and what we do will mold or shatter our own heart's desire."

FIVE LAWS OF GENETIC CONSERVATION

1. *Agricultural diversity can only be safeguarded through the use of diverse strategies.* No one strategy could hope to preserve and protect what it took so many human cultures, farming systems, and environments so long to produce. Different conservation systems can complement each other and provide insurance against the inadequacies or shortcomings of anyone method.

2. *What agricultural diversity is saved depends on who is consulted. How much is saved depends on how many people are involved.* Farmers, gardeners, fishing people, medicine makers, religious leaders, carpenters-all have different interests that foreign scientists could never hope to appreciate fully. All segments of a community need to be involved to ensure that the total needs of the community are met. The more involvement, the greater the potential to conserve.

3. *Agricultural diversity will not be saved unless it is used.* The value of diversity is in its use. Only in use can diversity be appreciated enough to be saved. And only in use can it continue to evolve, thus retaining its value.

4. *Agricultural diversity cannot be saved without saving the farm community. Conversely, the farm community cannot be saved without saving diversity.* Diversity, like music or a dialect, is part of the community that produced it. It cannot exist for long without that community and the circumstances that gave rise to it. Saving farmers is a prerequisite of saving diversity. Conversely, communities must save their agricultural diversity in order to retain their own options for development and self-reliance. Someone else's seeds imply someone else's needs.

5. *The need for diversity is never-ending. Therefore, our efforts to preserve this diversity can never cease.* Because extinction is forever, conservation must be forever. No technology can relieve us of our responsibility to preserve agricultural diversity for ourselves and all future generations. Thus, we must continue to utilize diverse conservation strategies, involve as many people in the process as possible, see that diversity is actively used and ensure the survival of the farm community-for as long as we want agricultural diversity to exist.

*From:

Cary Fowler, Pat Mooney. 1990. *Shattering: Food, Politics, and the Loss of Genetic Diversity.* University of Arizona Press, Tuscon, AZ.