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## QUESTION AND ANSWER

### *Where Our Food Comes From: Retracing Nikolay Vavilov's Quest to End Famine*

by Gary Paul Nabhan

**Q Why are Vavilov's historic efforts to keep a great diversity of seeds and fruits in our fields particular noteworthy today, when headlines warn us of a global food crisis, with "food riots" happening in more countries this year than ever before?**

**A** In essence, we are facing a global food crisis because for far too long we have used fossil fuels and fossil groundwater to feed ourselves rather than the "biological wisdom" expressed in tens of thousands of seed, fruit, root, and herb varieties. Because fossil energy and water were temporarily cheap, we used them to increase the yields of a few highly pampered crops, and neglected the rest of food biodiversity that had sustained farming cultures for centuries. Now that the costs of pumping fossil fuel and groundwater have risen dramatically, we can no longer remake agricultural environments to fit—or to pamper—a few crops; instead, we need to fit our diverse crops to the varying environments where food can be sustainably grown. By growing locally-adapted crop varieties with minimum inputs, and rebuilding regional food systems, we have the potential to feed more rather than fewer people.

**Q How might crop diversity help us respond to global climate change?**

**A** As we face the uncertainties associated with global climatic destabilization, it is far more prudent to have a thousand farmers growing several dozen crop varieties in their fields than a thousand farmers growing a single transgenic crop on millions of acres. Diversity is a bet-hedging strategy in the face of uncertainty. Orchard keepers in Tajikistan are already planting experimental orchards of dozens of farmer-selected fruit varieties at different elevations to see which can best meet their future needs.

**Q How is agricultural biodiversity a defense against rapidly-spreading pests and diseases?**

**A** If one crop variety is grown on tens of thousands of contiguous acres, it is an easy target for pests or diseases that can rapidly break down its defense mechanisms---i.e., its genetic resistance—in just a few seasons. By growing multiple varieties of the same grain or legume in a field, and by growing “polycultures” of several crop species in the same foodshed, farmers can slow down the spread of a disease and hinder it from becoming more virulent.

**Q** **What were Nikolay Vavilov’s particular contributions to using food biodiversity to fend off famine?**

**A** Vavilov was a Russian plant pathologist, geneticist, and biogeographer who grew up hearing one story after another of the historic famines that crippled Russia and Eastern Europe; he himself survived several famines that killed millions of his countrymen; this motivated him to utilize crop diversity as one means of reducing the impacts of drought, pestilence and plague on the food supply. In addition, Vavilov was trained by some of the first experts in “evolutionary genetics,” who looked at the interactions between plants, pests, microbes, and their environments through time. He realized that some arid-adapted crop varieties from one desert could be introduced to farmers in another desert, who could then more finely adapt them to their local conditions, thereby reducing the impacts of drought on their yields. These translocations of adapted crop varieties accomplished by Vavilov’s applied research teams literally fed millions of Russians for decades after his own untimely death by starvation.

**Q** **Vavilov is best remembered in other books by assembling a “World Collection of Cultivated Plants” into a seed bank that you liken to the great art collection of the Hermitage held just a few blocks away from the Vavilov Institute in Saint Petersburg. But in your book, you see Vavilov’s most important contributions as something other than the creation of this “ex-situ” gene bank. What is your estimation of Vavilov’s most lasting legacy?**

**A** From my perspective, Vavilov was the first to recognize that agrobiodiversity was situated in regions rich in biocultural diversity, such as mountainous areas where farmers speak a number of languages and manage their various crops in culturally-distinctive ways. In essence, his work anticipated the current interest of conservation biologists in centers or hotspots of biodiversity, but unlike many other biologists, he recognized indigenous cultures’ role in fostering, managing, and safeguarding this diversity. He may have been the first field scientist to record how this diversity functions in agricultural landscapes as a means of resilience. Today, we can use his meticulous field notes from various locations and cultures as benchmarks or snapshots of the crop diversity during his era, and compare what we find there today with what he found nearly a century ago. In short, his recognition that food crop diversity is of greatest value in the field and on the table is ultimately more significant than his attempt to bring that diversity into gene banks.