THE LAND REPORT

Fall 1987

Number 31

Contents

Number 31

Fall 1987

Photographs in this issue were taken by several different interns and staff persons.

On the Cover

The front cover photo shows the Land Institute interns listening intently to their host at the Kansas State University-sponsored soils classification competition, which they observed. From the top, clockwise, they are Veronica Mecko-Ray, Bruce Kendall, Doug Dittman, Amy Kullenberg, the Kansas State host, Patti Boehner and Jess Ennis.

In the photo on the back cover, the interns are walking on The Land Institute prairie.

At The Land

Fall Highlights

Dana Jackson

The fall session always seems to be the shortest. Between the resumption of classes early in September and the cessation of classes after Thanksgiving (so we can concentrate on analyzing field data and writing up the results of experiments), the weeks go by very fast.

Somehow in the blur of events, we do remember certain highlights.

Seventeen of us from The Land attended the Bethany College program to celebrate the bicentennial of the Constitution on September 17. We had been discussing the book, **Habits of the Heart: Individualism and Commitment in American Life**; and the program, "Reflection and Choice: Examining the Constitution," related to problems and ideas which had come up in class.

The day before the program, we enjoyed a visit by Page Smith, who was in Kansas to give the keynote adress at the Bethany College program. Page is an eminent historian and author of seventeen books, including the highly acclaimed two volume biography of John Adams and an eight volume **People's History of the United States.** Among the many topics we discussed were the philosphy of education and pedagogy and how one writes history.

The Land Report

is published three times a year by

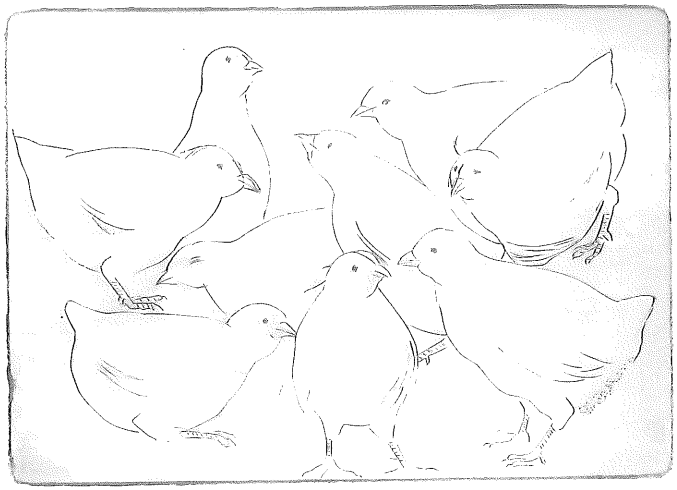
THE LAND INSTITUTE

2440 E. WATER WELL ROAD
SALINA, KANSAS 67401

Editor.....Dana Jackson
Arts Associate.....Terry Evans
Circulation Mgr..Sharon Thelander
Printed by Arrow Printing Company
Subscription Rate: $5.00 ($10,00 foreign)

Contributing to #31: Wendell Berry, Perdita Butler, Patricia Boehner, Doug Dittman, Jess Ennis, Marlene Howell, Dana Jackson, Wes Jackson, Roger Lebovitz, Amy Kullenberg, Thom Leonard, Veronica Mecko-Ray.

THE LAND INSTITUTE IS A NON-PROFIT EDUCATIONAL-RESEARCH ORGANIZATION DEVOTED TO SUSTAINABLE AGRICULTURE AND GOOD STEWARDSHIP OF THE EARTH.



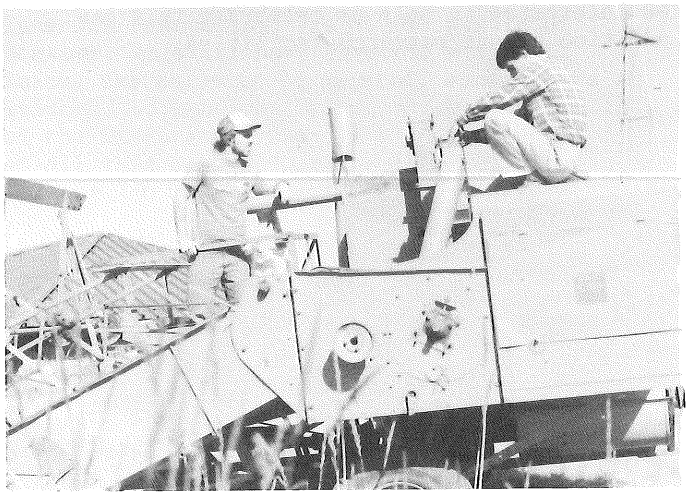
Page is also known for co-editing with Charles Daniel **The Chicken Book,** which was the outgrowth of a course they taught on the chicken at the University of California, Santa Cruz. After his visit, Page sent us the book and another creation of his titled "Group Dynamics" (above), with the inscription: "For the students and staff of The Land Institute with best wishes."

Jim Scott came through on September 29 and did a small concert on his twelve-string guitar for The Land Institute at the Marymount College Little Theatre. Jim played with the Paul Winter Consort in the October 1986 concert for The Tenth Anniversary of The Land Institute, and we were delighted to have him return.

Another Jim, Jim Smith from Los Angeles, talked to us during warm-up on the 20th about his job, apprehending and charging company officials responsible for illegal dumping of toxic and hazardous wastes in the Los Angeles area.

When the Bork nomination for Supreme Court justice was making the daily news, we invited Thomas Marten, former clerk to the Supreme Court and now an attorney in McPherson, Kansas, to speak to us about the qualifications for the job and the issues surrounding Bork's nomination.

The interns went to Kansas State University



Mark Gernes and Thom Leonard fix the combine.

On a sunny fall day, we held class outside.

to attend seminars and work in the library several days this fall. One day they combined a field trip to the Konza Prairie with a University soils classification competition which Orville Bidwell, a retired soils professor and member of our Board of Directors, had invited them to observe.

Dona Freeman gave a performance of "Planting in the Dust" at the Community Theatre in Salina on October 25th. Though we had been taking the play to Kansas communities all fall, this was the first opportunity for the public to see it in Salina.

We did not have our annual Fall Visitors' Day in October, as we have for the last ten years. We were sponsoring two public events, Jim Scott's concert and a Salina performance of "Planting in the Dust," and decided not to organize Visitors' Day in addition. But throughout the fall, there were visitors who came singly and in groups, such as the classes from Kansas Wesleyan, Bethel and Tabor colleges.

We did take time to do two other regular fall activities: harvest the honey from our two hives and combine the native grass seed on the 160 acres.

Jess Ennis, Jon Piper, Roger Lebovitz (in background) and Patti Boehner enjoy a tea break in La Hacienda kitchen.

Early in November, Penny Geis, Saline County Commissioner and professional mediator, discussed her work with the Kansas farmer/creditor mediation service. Steve Thien, a soil scientist in the Agronomy Department at Kansas State University, gave a seminar that same week.

The Land Institute Board of Directors met on November 14. All twelve members attended, including two new members: Bruce Colman from San Francisco and Conn Nugent from Amherst, Massachusetts. Paul Rasch gave the board a walking tour of the greenhouse and explained the next steps in construction. They also looked at the classroom building which was undergoing remodeling.

We gave our annual research presentations at Kansas State University on December 10. Preparing the papers for publication in the Research Supplement kept everyone busy right up to the start of our Christmas party on December 18, the last day of the term.

Board members Bruce Colman, Dwight Platt, Conn Nugent (holding architect's drawings), Mari Detrixhe and Wes Jackson get briefed on the greenhouse by Paul Rasch.

The Greenhouse Goes Up

Work on the greenhouse proceeded steadily but slowly this fall. Paul Rasch, our greenhouse coordinator, had help from interns in the afternoons, but with classes resuming in the morning and research tasks taking priority in the afternoon, there were fewer hours left for the greenhouse than there had been in the summer. Paul worked on the plumbing and built wooden boxes filled with rocks, which will serve as thermal mass as well as benches to hold the plants. Heat absorbed by the rocks will be released slowly at night, moderating the greenhouse temperature.

The interns and staff helped pour the concrete floor for the aisle along the north side and three walkways leading from the aisle into the greenhouse.

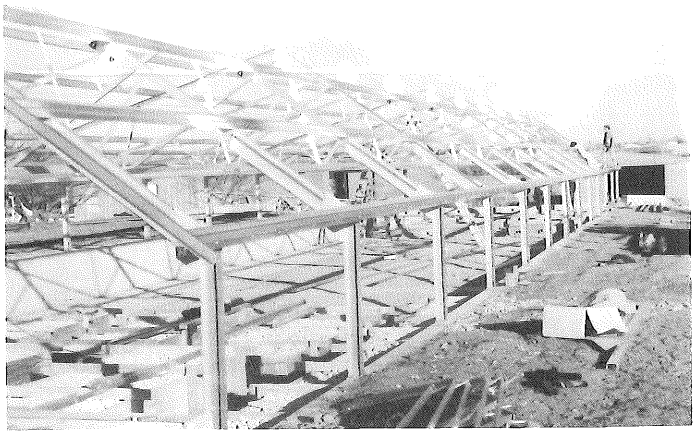
Research work was put on hold for two days when we installed the greenhouse framework. A truck arrived Wednesday noon, November 19, with the whole greenhouse structure. On Thursday, the interns and staff helped set the aluminum trusses and purlins in place; they all fit together like a giant erector set. It took teamwork to raise the sections and attach them on the sides. On Friday and Saturday they put in more bolts and braces to hold the framework securely.

Early in December, Paul had some extra carpentry help to frame in the walls and roof of the work room on the north, which will be used for mixing soil and potting plants.

There was another big cooperative effort when the glazing arrived. Everyone worked on Friday and Saturday, December 11-12, and some came back on Sunday, to get as much of the greenhouse enclosed as possible before the end of the term and the onset of winter weather.

Greenhouse to be Dedicated

On Saturday afternoon, March 26, there will be a dedication ceremony inside the greenhouse. Wendell Berry will be our special guest. We invite Friends of The Land and others who might be interested to help us celebrate this new addition to our research facilities.



Remodeling the Classroom Building

The south side of the classroom building looks very different now. When our operations manager Rob Fischer found new problems in the greenhouse (rot in the wood supports under the windows and termites in a post) last summer, we decided to tear it down. It didn't make sense to spend time and money rebuilding it when we had the new research greenhouse going up. We may build a small one there in the future to add heat to the building, but for now, we have a brick patio on the south which makes a pleasant, sunny place to eat lunch.

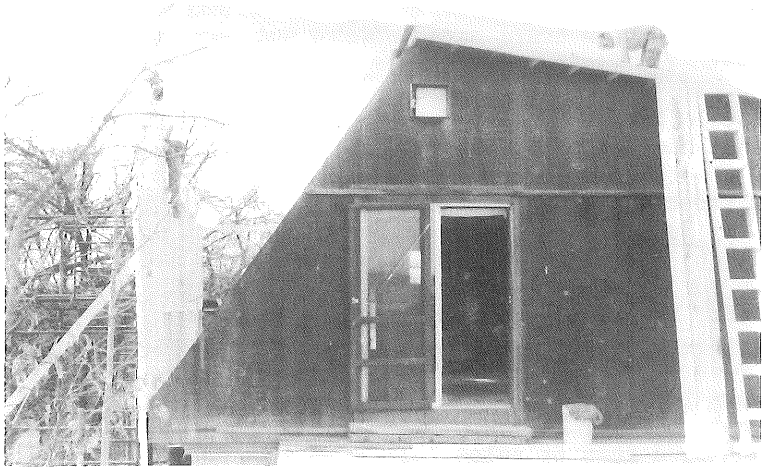
When we were looking at the greenhouse, we also examined the south wall of the classroom above the greenhouse which was covered with solar collectors. Wes had figured out the active solar heating system in 1976 when there weren't many models in operation to study. The solar literature then did not stress the superiority of conservation and passive solar over active systems as it did a few years later. The system we built worked well when we turned on a fan and brought the heat directly off the collectors into the classroom, but we were never able to store much heat in the center rock pile by bringing warmed air to it through ducts.

The collectors needed new black paint and complete recaulking. The ducts needed to be cleaned. Wes and I thought about the cost of repairs in terms of dollars and hours, and decided we would do something else. We hired Medina Construction to build a new wall straight up and add four windows for passive solar gain on the south side of the classroom and office. The classroom will be larger and better lighted.

Early in November when the work began, I moved my office to a bedroom in our house, and we began holding class in the research library at La Hacienda. Because of the need to get the greenhouse closed in before the snowstorms of January, we've not had workers to spare for the classroom remodeling. As of the middle of December, we still have electric wiring to finish, the walls to be painted, woodwork to be finished, bookshelves built, a carpet installed, and the library put back in place. We hope to get all this done before the 1988 term begins on February 15.

Volunteers Needed to Help with Library

Cleaning and reshelving all the books and magazines from our classroom library will be a big chore, and we need help. We are planning on having the shelves ready by the first week of February. We will unpack the boxes of books, clean off the sawdust and sheetrock dust, and rearrange the books on shelves. Anyone who can donate some hours to do this work should call Dana Jackson in January and schedule a time to help. (823-5376 or 823-8967)



A new south wall is started.

On the Road with "Planting in the Dust"

Marlene Howell

"We do basic research in sustainable agriculture and study the conditions necessary for creating a sustainable society." From the time I first heard phrases like these until now, quite a change has taken place in me. No longer just interesting and novel, The Land Institute's work and philosophy fit into a context I understand, for in the most direct sense we are talking about people's lives and the cultural values which limit or expand life choices. Being "on the road" in Kansas this past summer and fall organizing "Planting in the Dust" performances has afforded me the opportunity to see and experience what sustainability could mean to very real people in very real situations. The concept has taken shape and evolved (for me) in the faces of the people I met and the stories I heard.

We have performed the one act, one woman, dramatic monologue in twelve communities in Kansas: Chapman, Caldwell, Colby, Dodge City, Marysville, Larned, Concordia, Hutchinson, Manhattan, Emporia, Great Bend and Salina. The first ten were underwritten by a grant from the Kansas Committee for the Humanities. Most of these communities still have a rural character, although the larger towns have strong urban interests and concerns.

The points made in the play by the main character, Annie, have been generally understood by all, yet each community has also offered its own perception of the issues. For instance, we have yet to perform the play and not meet someone who has recently lost a farm or knows a friend who has. In every performance discussion we have heard at least one first-person dust bowl story. The universality of the message is commonly understood: we are losing something we value, something we love. A way of life, a heritage of pride and love, is slipping away.

And, perhaps most importantly, the collective voice we have heard says, "We're not going down without a fight, though some days the fight just is not in us." There is a sense among many people that actually times have been worse, and that they will persevere. Sustainability is not a theory to the many people we have met. It is a prescription for survival.

Each place has also offered its share of laughs and nerve-wracking last minute snafus. In our first location, the town was having a Labor Day parade before our show, and the sponsors had planned originally to have Dona Freeman, our actress, ride on a float. A few days before the show, they called to let me know that they had made a change. They were substituting a team of mules for the float with Dona on it. I decided simply to tell Dona that she would not be in the parade due to scheduling problems. How could I tactfully say, "You have been replaced by a team of mules"? Another place gave us a broken table (each sponsor is asked to provide a kitchen table and chair and a rocking chair) and only one spot light, so in addition to not being able to lean on the table, Dona had her usual stage space reduced by 50%. I was tempted to call that performance, "Planting in the Shadows." In another town, a photographer marched down the aisle during the performance, snapped half a dozen quick, bright flash shots, and marched out again. Dona somehow managed to keep her composure and deliver her lines, but it was not at all funny. We were surprised to learn that the photographer was employed by the local newspaper.

Each performance under the Kansas Committee for the Humanities grant has been followed by a discussion led by a humanities scholar. The topics in these discussions have been as varied as the audience members. One scholar referred to Annie as a "farmer." This led to a question of whether or not she had meant "farm woman" or "farm wife" instead of "farmer." The woman asking the question was glad to hear that "farmer" was used purposefully, because, she said, "I consider myself a farmer." Some communities focused more closely on the issue of "to whom the land belongs." The play has a line about the land "belonging to itself." This raised some interesting comments about whether the land belongs to itself, to God, or to us. Many people see themselves as servants of God and therefore stewards of God's gift of the land. Others do not attribute a religious value to land stewardship.

Written evaluations about the show have been interesting and thoughtful. Some people have written to let us know that the show was the talk of local coffee "clubs" the week following the performance. One man wrote: "A farm is more than 160 acres of dirt. It becomes a part of the family, a place that the young people can come home to, a place that represents security and a sense of unity with nature." A woman commented on her evaluation sheet: "More people need to see this play, especially those

Dona Freeman as Annie in "Planting in the Dust"

actively engaged in farming the land." Another mentioned that the play could be very educational for an urban area by helping people understand some of the problems rural people are facing. Most people who have seen the show have been able to relate to it on some personal level, whether or not they are farming.

Through organizing the performances of "Planting in the Dust," I have once again experienced something I've long believed; the arts truly are a way for bringing issues to light, involving one's feelings as well as one's intellect; in other words, the whole person. As I have said many times in regard to the play, "It touches the heart and the head. No crisis is solved without ample use of both." The people we've met in our travels know this, and their faces show it.

Planting in the Dust will continue its run in 1988. In January and February, we will be performing for the annual meetings of soil conservation districts (C.D.'s) in Kansas. For information about scheduling the play, contact Dana Jackson at The Land Institute.

Scheduled Performances

January 11 - Great Bend, Barton Co. C.D.
January 19 - Wichita, Sedgewick Co. C.D.
January 21 - Sharon Sprgs., Mt. Sunflower Univ.
February 3 - Mound City, Linn Co. C.D.
February 6 - Arkansas City, Cowley Co. C.D.
February 8 - Colby, Thomas Co. C.D.
February 22 - Columbus, Cherokee Co. C.D.
February 27 - Neodesha, Wilson Co. C.D.
February 29 - Goodland, Sherman Co. C.D.
March 7 - Beloit, Mitchell Co. C.D.

Energy Caucus Called

You've seen the ads in many of the popular magazines with the opening headline, "How nuclear energy can help defuse the next oil crisis." The The goal of the U.S. Council for Energy Awareness (financed by the nuclear industry and utilities investing in nuclear technology) is to convince the public that "nuclear electricity is a domestically produced alternative to foreign oil."

Cheap energy as a result of an oil glut in recent years has taken energy concerns off the agenda for public discussion. But the nuclear energy promoters are clearly prepared to take advantage of the inevitable return to higher prices and the public anxiety that will result. Proponents of the soft energy path should be prepared with a strategy for safer and cheaper alternatives to nuclear power. Much of our progress towards a renewable energy policy in this nation disappeared with the election of the Reagan administration. But the reasons for pursuing the soft energy path are still valid, and it is time to bring them out to the light of day again.

The Land Institute will host an energy caucus on Saturday, January 30, from 9:30 A.M. until 3:00 P.M. The meeting will be for persons interested in reviving the discussion about renewable energy sources and public policies which encourage conservation and solar technologies. We will send invitations to environmental organizations and individuals who have worked on energy issues in the past. This will be an opportunity for the renewable energy network to reconnect and assess what is happening in the energy field today.

Helping to organize the meeting will be three people who formerly worked at The Land Institute in energy programs: Mari Detrixhe, a research associate who worked on county energy planning; Paul Rasch, an appropriate technology intern and now coordinator of our greenhouse construction; and John Craft, former student who developed expertise in wind energy systems, then invented and manufactured the Windcraft wind electric machine.

Green Thumb Gathering

The fifth biennial organic gardening workshop will be held at The Land Institute on March 26 from 9:00 A.M. until 2:30 P.M.

Like past gardening workshops, this one will be held inside the classroom building, rain or shine. There will be no formal presentations, but experienced gardeners will lead the discussions. All participants will be encouraged to share their knowledge and experience. and garden slides if they have them. Choosing varieties, saving seeds, and growing bread patches will be featured topics.

Bring a vegetable to put in the soup pot as soon as you arrive, and some bread, fruit or cheese to share at lunch.

Job Opening

Joan Olsen has resigned to accept a position at Children's Hospital in Kansas City. The position of Director of Development is open at The Land Institute, and we invite applications.

Job Description

The main responsibility of the Director will be fundraising. The Director of Development must develop a plan for raising the operating budget and an endowment with the co-directors, write proposals to foundations and reports on grants received, contact individuals for contributions and communicate with those who have contributed, organize direct mail solicitations, and maintain the data base of funding sources. The Director of Development also shares responsibilities with the co-directors for institutional promotion, and maintenance of alumni records.

Specific Skills Needed

Good communication skills, both in writing and speaking, are required for this job. The director must also have organizational skills and be able to work competently with financial statements.

General Requirements

The Director must be philosophically in tune with the goals and work of The Land Institute and be able to speak accurately and comfortably about them.

Green House Manager Chosen

Mary Handley will be the manager of our new greenhouse. Mary has a Ph.D. in plant pathology from the University of California, Davis, where she gained experience working in a research greenhouse. She joined the Land Institute staff on a half-time basis in 1987. Mary is married to Peter Kulakow, plant breeder at The Land, and they have a baby son named Elliott.

1988 Prairie Festival

The 1988 Prairie Festival will be held on the weekend of May 28-29. We cannot announce the program at this time. Anyone not already on our mailing list who would like to receive the invitation/program in April should contact us and we will send one.

LAND INSTITUTE CALENDAR
SPRING SESSION 1988

January 30	--	Energy Caucus
February 15	--	1988 interns begin term
March 26	--	Green Thumb Gathering, an organic gardening workshop. Also, Dedication of the Greenhouse with Wendell Berry, special guest.
May 28-29	--	Tenth Annual Prairie Festival

Eastern Gamagrass: In Transition from Forage to Food Crop

Patricia Boehner

Land Institute researchers have been looking to the native prairie vegetation in search of species suited to fit into a perennial polyculture. One promising species of the tallgrass prairie is eastern gamagrass (*Tripsacum dactyloides L.*), a species traditionally known for its forage value. The Land Institute is not looking at eastern gamagrass (hereafter called gamagrass) as a forage, however, but as a potential human food crop. Although our research centers around its seed production qualities, we are also interested in other functions of gamagrass, such as soil stabilization.

Gamagrass is well known as a high quality forage for all classes of livestock throughout the year and averages 10-12000 lbs/acre. Its peak period of growth occurs during a time when other grasses are dormant or less palatable, thus, effectively increasing the grazing season. This is because gamagrass is a warm-season species, meaning its carbon assimilation pattern is one that is adapted to maximizing growth during the warm summer months. Researchers have suggested that gamagrass would be highly suitable for dryland areas with high water tables. Gamagrass is also considered to be a good substitute for forage sorghums, sudans, and millets under irrigation. It would offer advantages over these annual forages, because as a perennial it would require less energy for cultivation, its roots would hold the soil year around, and its production costs would be lower.[1]

In Central and South America, robust species in the same genus, *Tripsacum L.*, are widely cultivated for forage.[2] In North America, however, the forage contribution of gamagrass in native ranges has been small because of its sparseness, which in part is due to improper grazing management. In recent years, the use of eastern gamagrass as a forage has been limited because of its low seed production, inferior seed quality and establishment difficulties.[3] With current knowledge of the genetics and ecology of gamagrass, these characteristics have been largely overcome.

Eastern gamagrass is found throughout much of the eastern United States as well as in the eastern Great Plains. Its range extends from Nebraska to Massachusetts (42° N Lat.) southward to upper South America (24° S Lat.) . The habitat for gamagrass in the tallgrass prairie is usually the wet bottomlands, although plants are often found on the tops of hills.[4] Other species of *Tripsacum L.* have adapted to tropical and desert climates, sandy soils and other diverse conditions.[5] Of the sixteen known species in the genus *Tripsacum*, eastern gamagrass is the most widespread and morphologically variable.[6] (The origin of the name *Tripsacum* is said by some to come from the Greek word *tribein* (to rub), alluding to the smooth joints of this genus.[7])

The members in the genus *Tripsacum* are close relatives of maize (*Zea mays L.*); both are in the subtribe *Tripsacinae*. *Tripsacum L.* is the only grass genus with which domesticated maize (corn) is known to cross and produce viable hybrids.[8] Plant breeders have utilized germplasm from *Tripsacum* to introduce resistance to several diseases and possibly some insects into maize lines.[9] The genetic make-up of *Tripsacum L.* has been extensively studied not only because its genes are transferable but because it gives clues to the evolution of maize.[10]

Gamagrass reproduces primarily vegetatively by thick, scaly rhizomes which look much like the ginger roots found in the grocery store. These rhizomes spread out from the center of the plant so that the basal area of one plant may reach a diameter of one to several feet.

Both gamagrass and maize are monoecious (literally, in one house); the male and female flowers are on the same plant but not necessarily at the same positions on the plant. This monoecious condition in *Tripsacum L.* and *Zea L.* and the specialized cup-like seed cases of these plants indicate that both genera represent a "derived" or more advanced condition than their relatives in the same family.[11] I think little imagination is needed to see the connectedness of gamagrass to maize. Gamagrass looks like miniature corn with its broad flat leaves (broader than the other grasses in the prairie[12]), its reproductive stems which are taller than people, and its sex-separated seed head. Even though the male (tassel) and female (kernels) flowers on corn are not connected on the same branch as they are in gamagrass, variants are common in corn where male and female flowers are reduced and on the same branch, and those plants are technically called tripsacoid maize.[13]

Typically, the seed head of gamagrass has one to three branches, with the lower one-fourth or less of each branch containing the seed-bearing pistillate parts; the upper portion bears the male staminate parts. The seeds are enclosed in stiff casings which harden as they mature. Chet Dewald and Robert Dayton found a variant six years ago in north central Kansas where almost all of the florets are pistillate with the potential to bear seed. The bottom one-fourth of the seed head is similar to the

normal seed head, but the structures that surround the seeds in the upper three-fourths are not as hard or thick.[14]

The original variant, *T. dactyloides (L.) L. forma prolificum* Dayton et Dewald (referred to hereafter as the pistillate variant) has twenty times as many seeds as the normal gamagrass. The yield of the pistillate variant, however, is increased by only fivefold because the seeds are smaller and weigh less than the seeds from normal gamagrass plants.[15] With this increase in yield, a fertilized field (250 lbs/acre applied N) of the pistillate variant form of gamagrass can produce about 1000 lbs/acre of whole seed, which is about 660 lbs/acre of edible grain.[16] (For comparison, wheat yields about 1800 lbs/acre at a 30 bu/acre production level and corn about 5600 lbs/acre at a 100 bu/acre production level.) Chet Dewald, range agronomist at the United States Department of Agriculture (USDA) Southern Great Plains Research Station in Woodward, Oklahoma, is working extensively with the pistillate variant and predicts that another fivefold increase in yield from the pistillate variant is possible through breeding in the next five to ten years given the genetic base of gamagrass that we have now. Yields obtained at the Woodward Experiment Station from the pistillate variant have already doubled since the original variant was found in 1981.

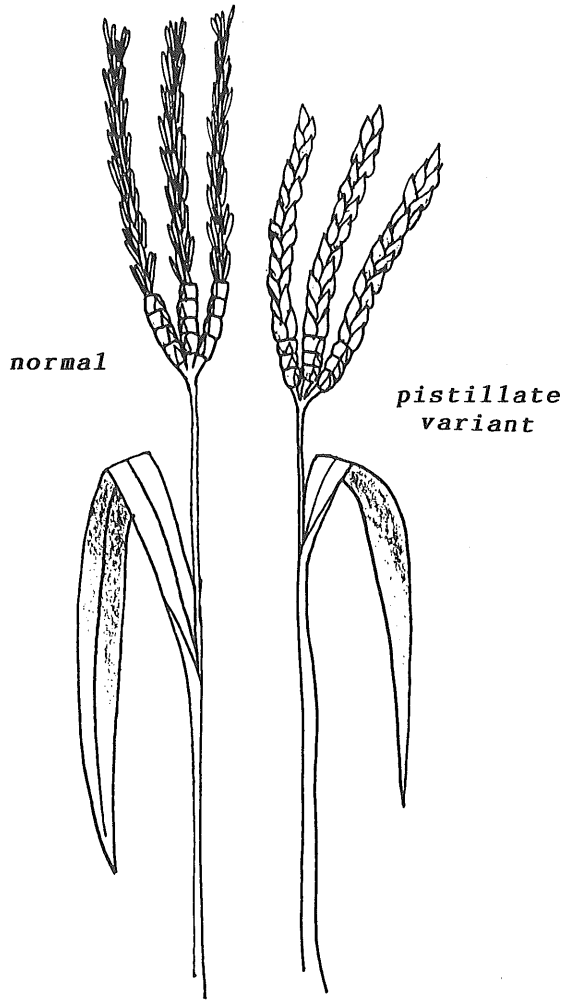
Yields from normal seed from the USDA Experiment Station in Woodward in 1978 were much lower; about 300 lbs/acre whole seed with only 21% of the seed being edible grain. This yield was comparable to the low-yielding early corn some 5000+ years ago.[17] This year we found (from a very small sample of two-year old plants grown one meter apart) yields of 160 lbs/acre of the normal type seeds and 250 lbs/acre of the pistillate variant type. The normal seeds contained roughly 35% grain.

Species in the same tribe as gamagrass (maize, teosinte, perennial corn, and Job's tears) have had a long history of use for food.[18] I have not found any references in the literature about the use of Tripsacum species as a human food crop. However, large quantities of the hard seed casings were found in the remains of the Ozark Bluff-dweller habitations.[19] There is some question as to how the seeds were cracked open and what exactly their use was to these early inhabitants.

As a food source, the nutritional value of gamagrass grain is impressive. The protein content of the grain is 27% while that of wheat and corn is about 17 and 10%, respectively. Gamagrass grain also has twice as much of the amino acid methionine as corn and is about 51% carbohydrate.[20] Gamagrass grain is readily digestible and, in addition, tastes good. It has a distinctive corn-nutty flavor when popped or ground into flour.

While the quality and quantity of gamagrass grain is respectable, there are other attributes of this species that make it particularly suitable for a perennial polyculture. As a perennial, the below-ground rhizomes and associated propagules allow gamagrass to survive the winter and begin growth again in the spring. As a grass species, gamagrass would be intercropped with a legume and/or composite species in the attempt to resemble the prairie's balance of species. Grass species in a polyculture are important because of their extensive root system and leafy canopy. Both aid in deterring soil erosion and compaction, and, once established, perennial grass species are effective in keeping many weeds out by reducing the light and nutrients available to other species.

As with all crops, gamagrass would require some management to optimize grain production and the overall health of the plants. Two characteristics which would require special management by a farmer are root binding and an excessive build-up of above-ground biomass. Root binding occurs when a plant produces a thick mat of root and rhizomes which impedes its ability to grow and be functional. Chet Dewald suggests breaking up the mass of old or dead rhizomes and roots mechanically every five or six years. This helps stimulate root growth and, subsequently, stimulates above-ground growth. Chet also states that once gamagrass is established and maintained in this way, it may never need to



be replanted. This means that the energy required for traction to establish and maintain gamagrass would be less than that needed to plant annual crops each year.

Gamagrass produces a profuse amount of vegetative growth. Grass species with this type of lush growth often need annual "house cleaning" or removal of the dead, above-ground biomass (or litter) before the beginning of growth in the spring. This allows for optimum conditions for growth and often increases the number of seed-producing tillers. Gamagrass litter can be removed in several ways.

One way is to burn the plants at a time when the plant is not actively growing. Burning gamagrass has been found to reduce insect, fungal and bacterial pests.[21] Burning also speeds up the mineralization process of the stand by reducing the organic matter into nutrient-rich ash which is deposited on the soil surface.

Another way to remove litter would be to let livestock eat it. Animals could graze right out in the fields after seed harvest. The quality of forage would still be relatively high, even after seed maturation. Gamagrass also makes excellent hay and has potential as green-chop or silage.[22] Some livestock owners have noted that their animals often prefer gamagrass hay over the best alfalfa hay.

Annual haying, however, may be detrimental to the polyculture in the long run if organic matter and nutrients are not returned to the soil. To keep the polyculture sustainable, farmers will need to pay close attention to fertility. Nitrogen could come from mineralization of organic matter, fixation from nearby legumes, and manure from animals that might eat the hay.

Gamagrass has evolved in the prairie under conditions of low to moderate levels of available nitrogen as a result of the slower, natural process of nitrogen cycling. In a recent study, Roger Anderson compared the response of gamagrass and corn to varying levels of inorganic nutrients and found corn to be more efficient in utilizing available nitrogen, although both species showed a positive response to increasing levels of inorganic nutrients.[23] Anderson attributed corn's efficiency to its adaptation and selection to take advantage of periodic flushes of inorganic nutrients as is found in naturally or artificially disturbed habitats. Gamagrass's adaptation to ecosystems that have steady levels of nutrients, however, is an important factor for its suitability in an agriculture where the aim is to not apply fertilizers from outside the system.

It is important to remember that in the tallgrass prairie, litter removal, root disturbance and nutrient cycling are all actively occurring. Above-ground biomass is removed periodically by grazers, decomposers and by fire, so that excessive build-up is not a serious problem. Mammals constantly disturb the roots by hoof-action, burrowing, wallowing and the like. The microorganisms, as well as larger plants and animals, significantly contribute to nutrient cycling. The closer we design our perennial polyculture to the natural prairie, the lesser the need for human intervention.

At The Land, we also consider practical matters such as harvesting and the processing of gamagrass grain. This year we tried harvesting our research plots to get a feel for the time and energy required. We collected a small amount of seed for planting and eating. Hand harvesting proved to be labor intensive, roughly 1.5 person hours for about one pound of whole seed. These figures were estimated from an unfertilized field with plants (both pistillate and normal types present) spaced one meter apart and from unskilled, but eager, intern labor.

A problem associated with harvesting gamagrass seed is that the seeds mature from the top down and usually break off sequentially. A non-shattering genotype of gamagrass has been found, however, and this trait could be incorporated into the crop through breeding.[24] Harvesting gamagrass seed for forage plantings is accomplished on a larger scale using a standard combine and passing once through the field when the majority of the seeds are mature but have not yet shattered. The flowering period for gamagrass can be several weeks in one plant. There is enough variability in gamagrass, however, to select plants for more concentrated flowering period so that one harvest will acquire the most seed grain possible.

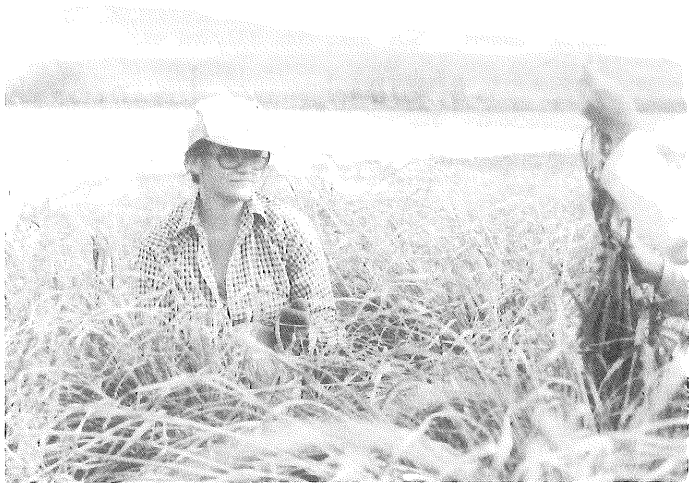
We sent some of the collected seed of the normal type seed head with the hard seed casings to Kansas State to be processed by Pat Dreese, former Land student who earned a Ph.D. from the Kansas State University Grain Science and Industry Department. He found gamagrass grain processing relatively easy because the technology is already available, both experimentally and indus-

Wes Jackson and Marty Bender planting the first plot of eastern gamagrass in 1978.

trially. Pat used corrugated rolls, similar to those used for wheat flour milling, to crack the hard seed casings. There is some difficulty in separating the cracked seed cases from the grain by aspiration or with screens because the size and densities can be similar. Milling gamagrass seeds with these hard casings may be more difficult than milling the softer casings of the pistillate variant seeds. However, the softer casings of the pistillate variant can be troublesome out in the field since these softer seed casings appear to be damaged more often from predators (insects and rodents) than the normal hard seed casings.

The Land's gamagrass research program began about ten years ago with Marty Bender and Jim Peterson transplanting gamagrass of different genetic stock (accessions) from Chet Dewald's plots in Woodward, Oklahoma. These plants were established and are maintained as a source of diverse genetic material which is essential for breeding purposes. They can be seen on either side of the driveway as you approach the classroom. The Land's plant breeder, Peter Kulakow, and James Henson have made plans to expand our stock of gamagrass germplasm in the near future to accommodate new accessions and to multiply existing accessions. James Henson held a post doctorate at The Land and is currently employed at the Kerr Center for Sustainable Agriculture, Poteau, Oklahoma. In 1986, he and intern Patrick Bohlen established from seed 77 different accessions of gamagrass from the USDA Experiment Station in Woodward, which were crosses of the pistillate variant and the normal type seed heads. In addition to collecting data on a number of morphological traits of these plants, Patrick monitored leaf diseases with Mary Handley, plant pathologist at The Land. Gamagrass is susceptible to some of the same leaf diseases as corn, although resistant strains appear to be more common. With a disease rating system, they were able to detect apparent resistance to disease in several of the accessions.[25]

This year, Mary and I looked at the leaf disease in gamagrass more extensively. We continued monitoring the 77 accessions planted last year, but also set up plots to study the environmental effects of season and geographic location on disease resistance of the different genotypes. James Henson established a genetically identical set of plants at the Kerr Center research station to observe location differences. Results from this year's research reaffirm the apparent disease resistance of specific clones, although there is some variability between the years of study and where it is grown. Future work with these gamagrass plantings will concentrate on the effects of disease and other factors on the grain yields of the given genotypes. Our research is tailored to fit the needs of a sustainable agriculture as we continually address gamagrass's role in a polyculture.



Patti Boehner and Mary Handley (hands on the right) study leaf disease in gamagrass.

Laura Jackson, Ph.D. candidate at Cornell University, is looking closely at the pistillate variant and the normal gamagrass plants to determine how these two types may differ in their pattern of resource concentration. With her findings, Laura also hopes to gain some insight on the question of whether or not perennialism and high seed yields are mutually exclusive.

In addition to the research done by The Land and affiliate groups and individuals, gamagrass has been extensively studied from its genetic make-up to its ecological status. This wealth of information, along with many attributes of gamagrass which make it extremely responsive to selective breeding,[26] will greatly aid in the development of this species towards a food crop.

We need to study gamagrass more to find out which of its characteristics will match those needed in a sustainable agriculture. We are fortunate that many other researchers are looking at eastern gamagrass as a species of great potential. We are also fortunate that nature has worked out many of the difficulties in maintaining a healthy plant population, and we need only to try and copy nature's "techniques". With these combined efforts, gamagrass is well under way in becoming an important member of The Land Institute's collection of potential grain crops.

REFERENCES AND NOTES

1. K. Vogel, C. Dewald, H. Gortz, and F. Haskins, 1985. "Improvement of Switchgrass, Indiangrass, and Eastern Gamagrass: Current Status and Future" in **Proc. 38th Ann. Mtn. Soc. Range. Manage.** pp. 159-170.
2. J.M. DeWet and J.R. Harlan, 1978. "Tripsacum and the origin of maize," in **Maize Breeding and Genetics**, D.B. Walden, John Wiley and Sons, Inc.
3. R.M. Ahring and H. Frank, 1968. "Establishment of eastern gamagrass from seed and vegetative propagation," **J. Range Mgmt.**. 21:27-30.

4. A.S. Hitchcock, 1951. **Manual of the Grasses of the United States,** USDA Misc. Pub. 200. 2nd ed.
5. J.R. Harlan and J.M. DeWet, 1977. "Pathways of genetic transfer from *Tripsacum* to *Zea mays*," **Proc. Natl. Acad. Sci.** 74:3494-3497.
6. D. Brink and J. DeWet, 1983. "Supra-specific Groups in *Tripsacum (Gramineae)*," **Systematic Botany** 8:243- 249.
7. Hitchcock.
8. DeWet and Harlan.
9. Liang-Shiou Lin, Tuan-hua Ho, and J.R. Harlan, 1985. "Rapid Amplification and Fixation of New Restriction Sites in the Ribosomal DNA Repeats in the Derivatives of a Cross Between Maize and *Tripsacum dactyloides*," **Develop. Genetics** 6:101-112. [eight references in Introduction]
10. DeWet and Harlan.
11. Vogel, Dewald, Gortz and Haskins.
12. John Weaver, 1954. "Grasses and Communities of Lowland," in **North American Prairie,** Johnson Pub. Co., Lincoln, NE.
13. J.M. DeWet, J.R. Harlan, and A.V. Randrianasolo, 1978. "Morphology of Teosintoid and *Tripsacoid Maize (Zea mays L.)*," **Amer. J. Bot.** 65:741-747.
14. C.L. Dewald, B.L. Burson, J.M. DeWet, and J.R. Harlan. 1987. "Morphology, Inheritance, and Evolutionary Significance of Sex Reversal in *Tripsacum dactyloides (Poaceae)*," **Amer. J. Bot.** 74:1055-1059.
15. Chet Dewald and Robert Dayton, 1985. "Registration of Gynomonoecious Germplasm (GSF-I and GSF-II) of Eastern Gamagrass", **Crop Science** 25:715.
16. Chet Dewald, personal communication.
17. Wes Jackson and Martin Bender, 1978. "Eastern Gama-grass: Grain Crop for the Future?", **The Land Report** 6:6-9.
18. John Martin, et. al.,1976. "Indian Corn or Maize" in **Principles of Field Crop Production,** 3rd ed. Macmillan Pub. Co., Inc. p. 329.
19. Melvin Gilmore, 1931. "Vegetal Remains of the Ozark Bluff-Dweller Culture" **Michigan Acadamy of Science, Arts, and Letters Paper** 14:83-102. (cited in Kelly Kindscher, 1987. **"Edible Wild Plants of the Prairie,"** Univ. Press of Kansas.
20. Lynn Bates, Martin Bender, and Wes Jackson, 1981. "Eastern gama grass. Seed Structure and Protein Quality," **Cereal Chem.** 58:138-141.
21. Jackson and Bender.
22. Vogel, Dewald, Gortz and Haskins.
23. Roger Anderson, 1987. "Growth of Eastern Gamagrass (*Tripsacum dactyloides L.)(Poacea*) Under Various Inorganic Nutrient Conditions," **Bull. Torr. Bot. Club** 114:46-52.
24. J. Lovell, 1976. "Germination Response to *Tripsacum dactyloides* for Four Seed Treatments," **Range and Wildlife Management Class Term Paper** No. 5316. Texas Tech Univ., Lubbock, TX, 17 pp. (cited in 13., original not seen).
25. Patrick Bohlen, 1986. "Multiplication and Evaluation of *Tripsacum dactyloides* Accessions Segregating for a Recessive Pistillate Mutant," **The Land Report Research Supplement**,3:30-33.

PHOTO ON RIGHT--
Perri, Patti, Amy, Roger, Doug and Peter count rhizomes in potted sorghum-Johnson grass crosses.

Fall Research Work

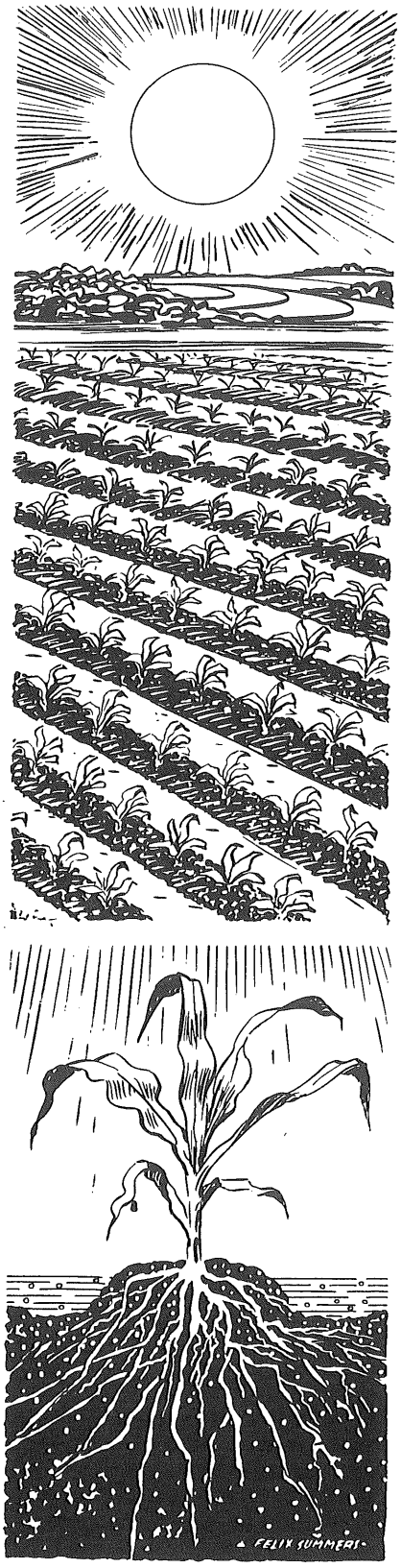
Amy Kullenberg identifies insects.

Mark and Carole Gernes clip above-ground biomass in prairie ecology study.

Traditional Roots for Agriculture

Albert Arens, Corn Breeder

Doug Dittman
Thom Leonard



Driving from central Kansas to northeast Nebraska, the topography changes from gently rolling to hilly. Straight running backroads begin to meander with the creeks that dissect the lowlands. Thin-soiled uplands remain in prairie pasture, but the majority of hilltops are crowned with linear rows of corn. Cedar County lies in the center of this hill country, bordered on the north by the Missouri River.

North of the town of Hartington, Albert Arens' farm lies low between sloping hills to the north and south. Windbreaks surround his fields and a stream meanders through. Over-looking the fields from the north, the Green Acres granary rises four stories above the slope, visible above even the grove of trees that surrounds it.

Albert Arens is 83 years old this year, and he contends that perhaps this fall's harvest is his last. But as he moves through his corn plot with the crew of huskers bringing in the fall crop, he's quick to stop a worker to point out and admire the color or size of an ear of corn. It's apparent that his interest has not waned.

We first learned of Albert Arens and Green Acres Hybrids in August from former Land Institute intern Mary Bruns. She had attended a farm tour sponsored by the Center for Rural Affairs' Small Farm Resource Center in Hartington, Nebraska. One of the stops on the tour had been Green Acres Hybrids' seed farm and research plots. Here was a corn breeder who, for longer than fifty years, had been breeding hybrid corn for this corner of Nebraska. He sold ninety-five percent of his seed to farmers within a fifty mile radius of his seed farm. His crops consistently yielded well without chemical fertilizers, without pesticides, and without irrigation. He had some unique material, both in his breeding lines and his hybrids. He was getting on in years and his health was failing. Mary had called because she was concerned that all his work might disappear when he passed on, and she thought perhaps the Grain Exchange could help, maybe obtain some of his lines and maintain them.

A few weeks later, Thom visited Albert Arens with Steve Ela, another former Land intern, who then worked with the Small Farm Resource Center in Hartington. What impressed us immediately at his research plots and seed production fields was the color and vigor of the plants. Quite a bit of the corn on the surrounding farms was prematurely browning due to leaf blights. Green Acres corn was green. One of Albert's breeding priorities is to get resistance to blight in his corn. "We always worked on color," he said.

For two or three hours, we talked, some while walking through the rows of corn, some while sitting in the shade of the cottonwoods along the edge of the field. As valuable as some of the breeding lines in his inventory might be, there seemed a greater value in his knowledge and his approach to breeding corn. The lines themselves might have a limited range of adaptability. Albert Arens' approach to breeding corn to be grown without petrochemical inputs could have wide application as we develop a sustainable agriculture.

It seemed the best way to learn from Albert would be to work with him. Thom offered to help during the fall harvest and evaluation. Six weeks later, we (Doug D. and Thom L.) went north again. During those three days in Cedar County, we helped pick the corn in his trial plots. Each row consisted of ten hills; in each hill were three plants. We counted missing plants, broken stalks, and

dropped (on the ground) ears for each row as we picked and tossed the husked ears into a metal bushel. The bushel was weighed and the data entered into the field book before the ears were dumped into the wagon. There were at times as many as seven of us picking. The work went quickly, and the early sunsets kept the work from stretching into a wearying task. We were probably the only hand-picking crew at work in the Cedar County corn harvest this fall.

As thorough as Albert Arens' understanding of corn breeding is, there are others, no doubt, that know as much. Very likely there are breeders who share his fascination with *Zea mays*. But how many share his values? How many corn breeders today have fifty years of experience breeding corn to be grown within fifty miles of where it was developed? How many value the soil and water enough to breed hybrids that perform best when grown in rotation and with no chemicals or irrigation?

After we picked the last ears in the last few rows, we were invited to the house for a dinner of homegrown foods prepared by Mrs. Arens and Mary, a close friend from the neighborhood. Carl Fredricks from the Small Farm Resource Center office in Hartington had helped with the picking and joined us for dinner and the interview that followed. Some of the questions were his, some Thom's. Most were Doug's.

Q: Did you once grow more seed corn than you do now?
AA: Yes, but I started cutting down on account of my health, oh, about ten or fifteen years ago. A friend of mine said to me at the time, "Albert, what do you kill yourself for? Just raise some seed for friends and neighbors and let it go at that. Out here in the western Corn Belt you can hail out, you can dry out. It's too risky for big crops." I always listen to older fellows. We didn't just quit. We had 37 salesmen at one time. We made more money then than we did at any other time. Corn was fifty cents and seed corn at six dollars a bushel and help at a dollar a day.

Q: What year was that?

AA: It wouldn't be any particular year. Well, probably the late '30s. When we started to cut back we didn't just quit, like I said, but whenever a representative would pass away or retire, we wouldn't replace him. We're down to only one sales representative now, a woman that used to work at one of the agencies.

Q: How many acres of corn did you grow at the peak?

AA: Oh, we grew corn under contract in South Dakota and around here. I'd say well over a hundred acres.

Q: What did you have in seed production this year?

Albert Arens and Doug Dittman

AA: Oh, very limited. Mainly just due to health, which is bad, but also on account of government programs. The programs have cut the sales on practically all commercial hybrids by 50%. A year ago we already took a 30% cut from the year before. Many seed corn producers have really suffered on account of this program. One other time when there was a government program, the government would subsidize us (seed corn producers), but this administration doesn't subsidize us now. There was a time when they would pick up the extra seed corn, pay us $3 a bushel to grind or feed it, or co-mingle it, as they called it.

So, it's a good time now for research, since we don't have to go heavy into production. We advertise a little and aren't very aggressive on that. We're just making a living, getting to know our people. We like it like that. I wouldn't change it.

Now our research acres are greater than our production acres. They have been for some time. That's (research) something we like to do. We (seed corn producers) have had too much promotion sometimes. A newer outfit would come into an area, and then their performance wouldn't be as good as they implied it would be. Of course that boomerangs and hurts the whole seed business.

Dr. (D.F.) Jones said that with any seed, in the area where it has been developed, there is no foreign or alien seed that can take you out.[1] Seed developed in an area will do better there than something developed somewhere else and brought in. It makes sense.

Q: Do you think that a young farm family could make a living today raising seed corn?

AA: John Lonnquist said that young people today, with all the research that has already been done, have a golden opportunity to go ahead in the seed business.[2] I think a young person could not just jump into the very competitive market today. He wouldn't be able to make it happen on advertising and promotion. He'd have to go real easy. If he were affiliated or

apprenticed to some operation with a history and reputation, then he'd have a golden opportunity. He'd have to build a reputation and have integrity.

Q: And sell locally?

AA: Oh, absolutely. You should have some acquaintance with the area where you get settled. After all, most seed corn is sold to a brother-in-law or neighbor. A lot of seed corn salesmen trade just a few bushels. The only reason most salesmen are in the business is that they need quite a bit of seed themselves. That way, they can get the seed at cost and make quite a savings. A lot of fellows selling seed corn today haven't got a big volume. Of course there are some of the major outfits that do. Of course, you have to like it.

Q: What started your interest in corn?

AA: When I was a kid at home, thirteen or fourteen years old, and I'd see a nice ear of corn, I'd have to admire it. I'd lay it in the back of the wagon, and ear-to-row it the next season.[3] I was just fascinated by a corn plant. Right up until today--this might sound poetic or whatever--but when you see what you can do when you cooperate with nature . . . it's hypnotic. When you can get out and see these beautiful ears of corn, grown under just normal conditions, without any extra attention or application . . . it's interesting.

Of course, all nature is, for that matter. We like to watch our wood ducks, a doe and her fawn. We call this our Garden of Eden. I wouldn't change a thing, not a thing.

Q: Where did you get your technical training or experience?

AA: I had a little schooling, but not much. I don't have a degree of any kind. I wanted to go to school pretty bad, but my dad changed my mind. I don't know if it was for good or bad, but I'm getting along all right. But I was there (University of Nebraska, Lincoln) long enough to see that it's all really interesting.

Q: Did you read books on the subject?

AA: Oh, yes, everything. It was something I really liked. Some I almost know by heart.

Q: What do you specifically breed for in your corn? What are your priorities?

AA: We have three of them. We've had different ones over the years and we've made some mistakes. For a while, for instance, we went too heavy into high lysine corn. We went too heavy into male sterile and restore programs. You've got to stay in the middle of the road.

At one time we took rootworm resistance seriously. We went to quite a bit of bother; it was one of our major projects and we made wonderful progress on it. But once when John Lonnquist was here, we were looking at our rootworm trial. We realized that of all the things that can affect corn, the corn rootworm is the easiest to control in a rotation. And right there we decided that we are not raising corn for the guy that mines his land and exploits it, but for the practical farmer that rotates his crops. We've got a lot of rootworm and corn borer tolerance just by selecting a little for that and letting the parasites and predators build up. It takes a few years for them to build up, and there are always problems, but there are problems when you use chemicals, too.

But going back to our current priorities. We have three. Number one would probably be the blights and the viruses, to try to get immunity or tolerance to them. The second one, and this would be in close competition with number one, would be the synthetic varieties[4] with a real wide genetic base. We think it's going to be feasible. We've raised them for four generations now without losing any yield factors. And the third would be multi-eared hybrids. We've been playing with multi-eared corn, but you have to grow them on good, high fertility soil and keep the population between twelve and fourteen thousand. On our tests today, some of the highest tests came from the multi-eared corn. I think these three are good projects to follow.

Q: You base your breeding on Cedar County and this area?

AA: Some people will say that conditions on this farm are better than on others in the county. Well, some of these multi-eared corns ought to be grown on bottom land, but in our county 40% of our farms have a stream flowing through them and have bottom land. We also have shelter belts that protect our crops, but there are no laws against planting trees. There are no reasons why the other guy can't do it.

Originally there was mainly bluestem here, and some native plum shrubs. The Norwegian midwife that brought me into the world would pull those cottonwood seedlings out of the sand bars, wrap them in burlap, and strap them to her back. She planted two miles of trees.

To encourage settlement, the federal government would give you a tree claim. If you planted a certain number of trees on a quarter section, after a certain number of years that quarter section was yours. They did a lot of smart things earlier to get this land settled and now we've abused it all. I think our ancestors would be disappointed in the young people that think if they can't get it with a sprayer and a $40,000 tractor, they're not going to do it. In my book that's wrong. You can control a weed, but you'll never eradicate it. You've got to get in there with your blood and your sweat and your hoe.

You hear about bio-tech and all this. Advances have been made, especially in animals,

but you still have to have a good gene to start with and you have to have Indians, you can't do it with chiefs. I visited a place a few years ago that at the time ranked seventh or eighth in the United States in seed corn production. They had seven or eight vice presidents, each with his own suite and such, but you can't do that, you've got to stay practical. That outfit now has problems. Their overhead was too big.

Q: Do you believe that there's a scale that works better than others?

AA: Anytime in anything, when you get too big you're going to neglect something, and the first thing you're coming out with mediocrity.

Q: What is your vision of the future?

AA: Well, in the first place we have 93 counties in our state and except for four or five all are agricultural or ranch. I would like to see some legislation down there (in Lincoln) that would deter the exploitation of our water and natural resources. I don't believe anyone should have but one irrigation well. That should give him a living. I think they should have certified applicators, especially in the line of toxic materials. All around the county you see young cedar trees starting out in pastures. I maintain that they are the parent material for our area and that in another 200 years I think it will be mostly scrub timber. Our towns will be gone, our schools will be gone, simply because we don't have good water, possibly any water. They can't possibly run cattle because a mature critter will drink 35 gallons of water on a warm day in the summer months. If they want to feed cattle; they should take the water out of a stream or lake, not pump it out of the ground.

I absolutely don't like walkers [center pivots]. They aggravate our erosion. I've talked to our local legislator about that. There are three hundred and some walkers in Cedar County, and most of them, including the walker and well, represent an outlay of $100,000. I told him, "You're a businessman. All that $100,000, it all leaves the community. It's sterile money. Wouldn't you like to have a crack at that?" I think that's a real fair argument.

We're mining this country. We're taking it all out and sending it away. It all goes and lines some millionaire's pocket.

Q: This looks bleak, Albert.

AA: I can't see it as being any different. In fact, I can make it a little more drastic. We've got two dry wells on this farm right now. One guy has six walkers and a gun sprinkler here in this neighborhood. It's illegal to pump water past a farm, and that's done, too. What are their grandchildren going to have? And the trouble is, they're indebted into seven figures.

Q: Well, there are farmers like John Fleming.

AA: And we're getting more of them. There's no reason why anyone else couldn't do the same thing. All these things are practical; he hasn't gone to any large expense. He's just a practical farmer. He farms on the contour and he strip farms.

When a business is in trouble it sounds nice to say they are "over-extended." When a farmer's got that same deal, he's "over- powered." He's got the whole yard full of big, new machinery. It's the farmer's own fault. I heard from an implement dealer, "You know, the whole world would be better off, including the implement dealers, if we'd never had anything bigger than four-row machinery." I'd go along with that.

Q: Would we be better off if we never had hybrid corn?

AA: Yeah, if those big operators would have to sit in that crib sorting the ears all out and maybe pick by hand, things would be different. They'd have so many broken plants and stalks on the ground, they couldn't possibly run that combine. When Nixon went into China, they had pictures of when the plane landed. They had workers with bamboo leaves brushing the snow off the runways. They got the job done, and they're all employed.

It's bleak. Maybe I'm lucky I'm 83 years old and won't have to live to see some of this. I do feel sorry for the younger people growing up today.

Q: So you think it would be better if row crops played a more limited role?

AA: In the first place we should get back to one irrigation well. And no chemicals, that is no lethal chemicals, and that includes a lot of our nitrogen fertilizers. We've got to raise more sod crops. And more small grains. The last couple years oats have been going for more than corn. There's a lot less work to oats. Growing oats will increase a man's farming acreage by 1/3 because it doesn't take him long to put in a small grain and it doesn't take long to harvest it, and he can do it in periods of the year when he's not busy with corn. We're just too damn progressive!

Q: Without horses on the farm, what are going to do with all those oats?

AA: Eat 'em. That's what the Scots live on. We eat it for breakfast. It's a pretty good breakfast, too. Only thing, I hate to sell a bushel of oats and just be able to buy an eighteen ounce package of oatmeal back. Of course the same holds true with corn. The oats can be fed to anything on the farm: chickens, hogs, calves, fattening cattle, dairy cattle. Oats is a wonderful feed.

If our granddads could see this we'd all

be disinherited. They'd think we should be out in the fields with a team of horses, and if there's an ear that fell out of the wagon, go get it. If there's an ear in the sand burrs, pick it up and brush the burrs off. It's changed some.

References and Notes

1. D.H. Jones was a pioneer in hybrid corn research for the Connecticut Department of Agriculture, New Haven, Connecticut.
2. John Lonnquist worked at the University of Nebraska Agricultural Experiment Station from 1943-1949. He was a professor of Agronomy from 1949-1961.
3. Involves the selection of a number of phenotypically desirable ears and the evaluation of these ears by a progeny test. Described in G. F. Sprague, 1955. "Corn Breeding" in **Corn and Corn Improvement**, (Academic Press, NY), pp. 225.
4. The term "synthetic variety" is used to designate the advanced generations of a combination of many proven cultures increased by open pollination. Work in 1949 by Lonnquist compared yields of a synthetic bred from eight inbred lines with a standard double cross hybrid and an open pollinated variety. Over a three year period, the average yields of the synthetic were superior to either the hybrid or the open pollinated variety. Personal correspondence with Albert Arens and from Sprague, pp. 255-257.

The Grain Exchange

Thom Leonard

As this first season at the Land Institute ends, the next has already begun. We harvested seed from 35 open-pollinated corn varieties and sixteen soybean cultivars. Beneath a blanket of snow, some forty winter cereal accessions, mostly wheat, lie dormant, awaiting the warmth of spring.

Carole Gernes worked diligently, faithfully, and cheerfully with me for five weeks in the summer, pollinating corn in the one-hundred plant populations and, after the storm of July 12, nursing the wind ravaged plants along. Land interns helped throughout the early part of the growing season in controlling weeds in the corn plots. We played defensive war games to counteract the invasive tactics of racoons and lost some seed of short varieties to ground squirrels who had taken up residence within the plots. Despite hardship, we managed to increase seed of everything planted and to evaluate the accessions for their adaptibility to our conditions.

We had larger open-pollinated plantings of three traditional Native American varieties and harvested over a bushel of each. Two of these, Mandan Nuetta (Red Sweet) and Mandan Yellow Flour, will be available through Abundant Life Seed Foundation (P.O. Box 772, Port Townsend, WA 98368) as well as through the Grain Exchange spring seedlist to be mailed to subscribers in February. The third of these, a blue mixed flour and dent corn from South Dakota, will be available only through the Exchange.

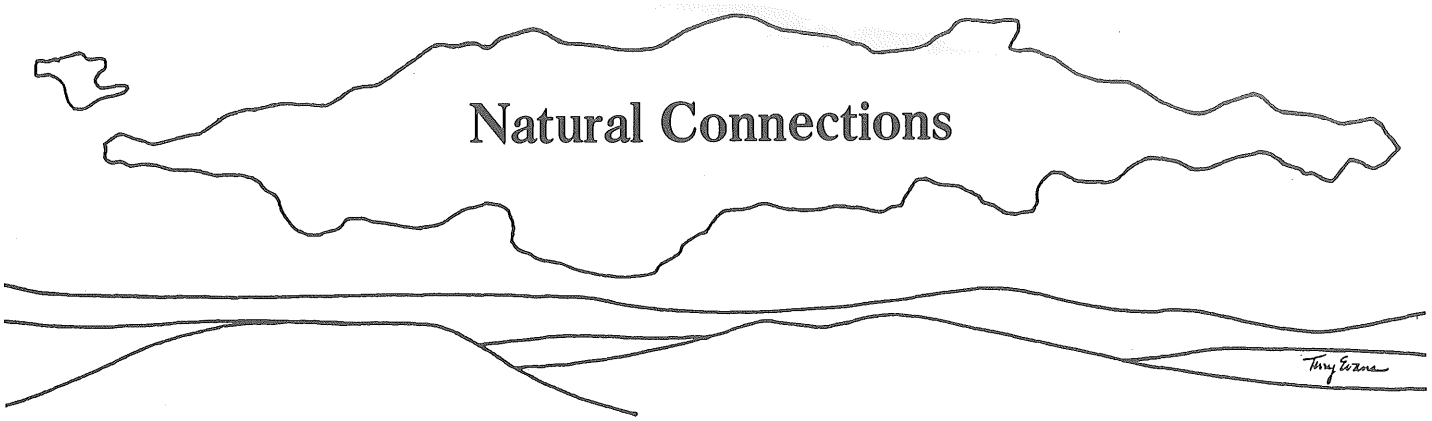
We will grow larger populations of fewer varieties in next year's hand-pollinated plots, concentrating on varieties indigenous or adapted to the Central Plains. A few of the more promising varieties from this year will be grown in larger open-pollinated isolation plots for seed increase so that they can be available to more growers in 1989. Some of these are pre-hybrid era dent corns including "Pride of Saline," "Kansas Sunflower," and "Challender's Blue and White." We will also grow selections from this year's mixed blue corn and a variety of Sioux white flour corn.

In cooperation with the Central Prairie Seed Exchange (CPSE) and the Kansas State Historical Museum, we will be increasing seed of a rare Pawnee flour corn for museum display, preservation, and eventual distribution. CPSE president Dianna Rogers has been instrumental in making connections with people involved with archaeology throughout the region.

In 1987 the Grain Exchange published a spring and a fall seedlist and two newsletters. The second of these was completed in December with the assistance of Land intern Amy Kullenberg. In 1988 we will publish three thematic issues. Each of these will feature a specific crop, including articles on genetic preservation, growing and harvesting techniques and technology, and cultural and biological history. Topics of general interest for those growing grains or concerned with genetic conservation will also be included. The spring issue will focus on wheat; the summer, rice; the autumn, corn.

To receive an informational flyer about the Grain Exchange, send a twenty-two cent stamp. To receive the current issue of the newsletter, send $2.50. Annual subscription fee, which includes three issues of the newsletter and the seedlists is $7.50.

Thom Leonard shelling corn.



The Prairie: a Model and Metaphor for Sustainable Agriculture

Roger Lebovitz

The Land Institute has taken the prairie as the model and metaphor for research in sustainable agriculture. The role of model is primarily physical in shape and intent. With it we ask questions about species compositions, biomass ratios and the like, and seek answers with regard to the restructuring of agriculture along the lines of the prairie ecosystem as it is found in our region of central Kansas. The role of metaphor is much broader. The prairie takes the part as a living symbol of ecological integrity to which, as a standard, the faults of ten thousand years of farming (epitomized in the inadequacies of present practices) may be held up. The prairie runs on sunshine and accumulates soil; the local wheat and sorghum fields are dependent on fossil fuels and are losing soil. This stark contrast exposes much of the reason for our use of the prairie as a standard for agricultural sustainability.

The prairie as we see it now is the result of thousands of years of interaction between assemblages of plants and their environments. Climate, topography and fire have been the deciding elements in its vegetational history. In the period before European colonization and cropping, fires set by humans and by lightning spread over flat and gently rolling plains and encouraged the establishment and expansion of grasslands, and simultaneously restricted the presence of trees to floodplain valleys.

The recent history of the prairie, however, is not the entire story. Prairie vegetation has a history measureable in the tens of thousands of years; this time frame must be considered if we are to understand sustainability as a matter of ecological longevity. This consideration leads to certain questions. What is the history of the grasslands of central North America, and what does this history teach us about the role of the prairie as model and metaphor of agricultural sustainability?

At issue here is the age of the grasslands of the central midcontinent, and particularly the center of the region, Kansas. Until recently it was assumed that the prairie possessed a history reaching continuously as far back as the Miocene Era, at least seven and a half million years ago. Several lines of evidence, however, have called this account into question. In a summary article on the topic, Daniel Axelrod has argued for a relatively youthful grassland. The grassland, he contends, is related to a period of drier climate which encouraged widespread fires that caused the destruction of previously established forests and woodlands. The grasslands initially encountered by the Europeans were the ecological result of the latest and paleobotanically best documented period of aridity.[1]

The youthfulness of the prairie biome is corroborated by a lack of plant and animal species endemic to the region, by the presence of many grassland species in adjacent forested regions, by the occurrence of relict and disjunct tree populations throughout the area, and by the invasion of grasslands by woody vegetation following recent agricultural settlement. Lack of significant endemism implies a shifting species composition, due perhaps to an alternation of grassland and woodland ecosystems. Similarly, species common to the prairie ought also to extend to adjacent biomes if their evolution were not confined to a single, distinct biome. For instance, many of the common prairie grasses have geographical ranges throughout eastern North America. The presence of disjunct and relict tree populations scattered throughout the grassland region is additional evidence for its youthfulness. Isolated populations of the white spruce in the Black Hills of South Dakota, as well as the distribution of woodlands on topographical escarpments, represent what once were forests of greater range. Their larger extent relates to a cooler and moister climate that eliminated grassland fires. The remnants are now confined to escarpments serving as firebreaks against the passage of prairie fires.[2]

Fire, above all, is the factor most responsible for the emergence of the grassland biome. Combined with the flat and rolling topographies of the region and a dry season during which combustible materials, principally dry grasses,

were produced, fires spread by strong winds encouraged the growth of herbaceous species at the expense of woody species. A combination of natural and human-caused fires appear to be the deciding elements in the treeless condition of the plains and prairies.[3] The suppression of fire during recent white settlement and the concurrent establishment of trees in many prairie areas is additional evidence for the dominating role of fire. The interaction of the four factors discussed here suggests that the grassland region of the central midcontinent was transformed during times of cooler and moister climate. Greater precipitation and lower average temperatures put a stop to wide ranging fires and at the same time helped spread woodlands and forests from the edges of the region. These conditions prevailed generally during the latest Wisconsin glacial maximum of approximately twenty thousand years ago.

Vegetation history is commonly studied through fossil pollen spores embedded stratigraphically in lakes, bogs and marshes. Although these landscape features are infrequently distributed in many parts of the grassland region, enough exist to give an estimate of past conditions. In northeast Kansas, two marshes near Arrington and Muscotah in Atchison County have been studied. At these sites, researchers uncovered pollen as old as 23,000 years. A forest composed primarily of spruce dominated the vegetation from 23,000 to 15,000 years ago. The pollen from this zone also included deciduous trees such as alder, birch and willow, as well as pine, although in smaller amounts. Grasses and other herbaceous pollens were also found in smaller numbers. A hiatus occurs between 15,000 and 11,000 years ago, but from then on the pollen record indicates a hardwood forest mixed with prairie. Common species of this vegetation zone included oak, elm and ash, as well as grasses and composites. At 8,000 years, the typical grasses and forbs of the prairie vegetation dominated. From 5,000 years ago until the present, the pollen record shows an oak hickory forest in the lowlands and prairie remaining on the uplands.[4]

This pattern of spruce forest followed by hardwood forest followed by prairie is typically associated with climate change. The spruce maximum is linked to the generally cool and moist climate of a glacial advance. Between 20,000 and 15,000 years ago, the ice of the Laurentide glacier had advanced as far south as northern Illinois and northeastern Iowa. This covering of a large portion of the North American continent with glacial ice was the result of a global cooling, and it led to widespread alteration of the biogeography of North America.[5] The change in vegetation in what is now the grassland region was therefore not an isolated event, but part of a continental, and global, geological and biological phenomenon.

In other parts of the prairie, changes similar to those of the Kansas vegetation occurred. Generally, the pollen record indicates a change from predominantly woody to predominantly herbaceous species. In the Nebraska Sandhills, the pollen record reveals that s spruce-boreal forest once occupied a site on the Rosebud Indian Reservation about 12,000 years ago. This forest was followed by a grassland with a significant population of ponderosa pine. The spruce pollen uncovered at this site has been connected to the present occurrence of a disjunct population of white spruce in the Black Hills, some 130 miles northwest, implying that the Black Hills population is the remnant of some older spruce forest of wider distribution.[6]

The pollen record shows marked changes in the ecological composition of the area we now describe as "prairie." Does this record challenge the value of the prairie as a model and metaphor of agricultural sustainability? There can, of course, be no simple interpretation of the pollen record from just the short summary given here, yet the fact of change appears well grounded. Given this record of vegetational change, should we continue using the prairie as a model and a metaphor?

The answer to this question is yes. The periods over which vegetational change occurs are measured in the tens of thousands of years. The period of concern to sustainable agriculture can be shorter, perhaps five hundred to one thousand years. In this shorter period, discernible vegetational change does not happen; the prairie vegetation is essentially stable.

One relevant definition of a "model" is a pattern from which something is to be made. We think the prairie is a pattern from which a sustainable agriculture can be made. This pattern is ultimately the ecological principles (tight nutrient cycles, for example) that are unaltered by episodes of disturbance. The use of these principles as a model for sustainable farming (the use of the prairie) is therefore still valid when we consider the vegetational history.

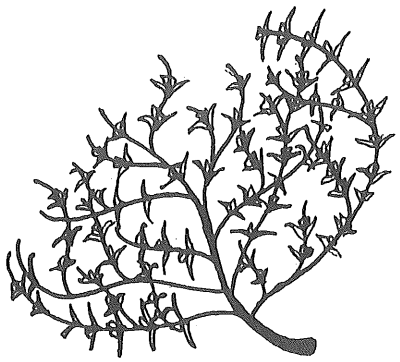
The prairie also constitutes a metaphor of sustainable agriculture. The metaphor is related to the model, but is also much broader. It is not exclusively concerned with the living nuts and bolts of ecosystem design, but rather with the larger standards and visions that govern the use of the model. As a metaphor, the prairie is essentially a living vision of the characteristics of sustainability. Running on sunshine, retaining its soil, accumulating ecological capital, it is a stark contrast with the crop fields plowed from it. Knowledge of the prairie's vegetational history extends the metaphor backwards in time.

Aided by the more thorough "sense of place" which we can gain from studying vegetational history, we can proceed in our efforts to develop a sustainable agriculture modeled after the prairie.

References on page 24.

Old *Salsola*

Wes Jackson



Ten A.M., January 2, 1986. Through the windows of John's cabin, perched on a low bluff, I look northward over the Cheyenne Bottoms near the Great Bend of the Arkansas River. A strong wind blows from the northwest. Between where I sit and the expanse of water in the bottoms lies a poor pasture, some alfalfa fields, and newly worked sorghum ground. Tumbleweeds of the genus *Salsola* roll across these fields like purposeful animals migrating to some destination beyond the horizon. They look purposeful anyhow. They look at least as purposeful as the skein of geese that rises out of the bottoms each morning, forming long poor V's and heading south to shop for breakfast in the fields of shattered sorghum. The wind that propels these weeds and the wingbeat that propels the geese are from the same source: transformed sunlight. Barbed wire fences have stopped some thousands of these weeds, but thousands more roll right over, even where their dead relatives have not accumulated against the wire. A moment ago, one particularly bouncy weed rolled right over a fence, bounding almost like a deer, but with one important difference: a dead *Salsola* mother will hug the same wire that a live deer clears. Free of the fence so briefly hugged, the cheerful dance of the dead continues. I wonder what is the average number of seeds dropped at each bounce. Surely less than one, but there are lots of bounces in this winter trip of a dead *Salsola* dispersing her children.

Was it she or the "larger system," an ancient ecosystem, that prepared her for this day of winter wind? Born in June, her branching pattern makes her round by fall, testimony to her ability to remember the past and foresee the coming season with each cell division. But there is more to this globular weed than her shape. For all through the summer, at the base of her stem, she formed an abscission, a knotted ring of cells for easy detachment at ground level in late fall. I don't know whether she or the larger ecosystem was most responsible for that knotted ring, but the wind does seem a fitting hearse for a last ride to a fenceline cemetery. What other plant could beat *Salsola* in this respect: that it is only in her death that the most energetic and widespread dispersal of her offspring could happen?

from *Sabbaths*

Wendell Berry

What stood will stand, though all be fallen,
The good return that time has stolen.
Though creatures groan in misery,
Their flesh prefigures liberty
To end travail and bring to birth
Their new perfection in new earth.
At word of that enlivening
Let the trees of the woods all sing
And every field rejoice, let praise
Rise up out of the ground like grass.
What stood, whole in every piecemeal
Thing that stood, will stand though all
Fall--field and woods and all in them
Rejoin the primal Sabbath's hymn.

.....

I go from the woods into the cleared field:
A place no human made, a place unmade
By human greed, and to be made again.
Where centuries of leaves once built by dying
A deathless potency of light and stone
And mold of all that grew and fell, the timeless
Fell into time. The earth fled with the rain,
The growth of fifty thousand years undone
In a few careless seasons, stripped to rock
And clay--a "new land," truly, that no race
Was ever native to, but hungry mice
And sparrows and the circling hawks, dry thorns
And thistles sent by generosity
Of new beginning. No Eden, this was
A garden once, a good and perfect gift;
Its possible abundance stood in it
As it then stood. But now what it might be
Must be foreseen, darkly, through many lives--
Thousands of years to make it what it was,
Beginning now, in our few troubled days.

.....

These poems are reprinted from **Sabbaths** (North Point Press, San Francisco, 1987) with permission of the poet and the publisher. The first was set to music by Paul Halley and performed by the choir of the Cathedral of St. John the Divine in New York City on November 9, 1987.

"Old Salsola" is reprinted from **Altars of Unhewn Stone** (North Point Press, San Francisco, 1987) by permission of the author and the publisher.

Farming as a Livelihood

Amy Kullenberg Patricia Boehner Perdita Butler Veronica Mecko-Ray

We four women interns decided to co-author an article about women in American agriculture. Our purposes for the joint effort were to strengthen our skills in group communication and cooperation and to learn more about women, who, in general, are integral to farming, but whose views, concerns, and contributions are not often articulated.

We wrote this article from tape-recorded interviews of four women of varying ages and experience who currently live in the Salina area. Though each women was interviewed separately, we arranged their responses in a dialogue format to simulate an actual conversation which might have occurred.

This is the second part of the article; the first appeared in issue number 30 of The Land Report under the title, "The Role of Women has Changed, and my Husband Doesn't Want Pie." That conversation dealt with the role and function of women on a farm, the interaction of family and neighbors, the responsibilities of raising children, and the ways in which women become involved in the vocation of farming. In this portion of the article they discuss some of the economic problems in farming, the role of government subsidy programs, and whether there is a future for their children in farming.

We are grateful to the four women for talking to us about their lives and giving us a better understanding of American farm women both past and present. In October we invited them to visit The Land Institute. Over coffee and cookies, they had a real dialogue (without the tape recorder). We enjoyed their warmth and liveliness as they chatted about common acquaintances and experiences.

Here is the second installment of our "dialogue" among four Salina County farm women. The participants are described below in order of their appearance.

------BEA: age 77; now retired from farming, living in Salina.
--SHIRLEY: age 51; works for the Soil conservation Service, has grown children.
-----LYNN: age 37; married to a rancher in partnership with his father and brother, mother of two daughters active in 4-H, works as a teachers' aide.
--REBECCA: age 27; a city girl who married a farmer and has pre-school children, works as a teacher's aide.

CHILDHOOD REFLECTIONS

BEA: Farming has changed since I was a girl. In those days, kids were just kids, and they did whatever the family needed. I helped my mother as much as I could. There were several children in Will's family, and as they grew older, the chores were divided among the children so that each one had a certain job. I remember that one of the boys had to iron all of the shirts.

SHIRLEY: I grew up on a farm just after farmers had stopped using horses. I don't remember what it was like to farm with horses. However, Ed does; he's five years older than I am. I enjoyed growing up on the farm. We always made our own butter and gathered our own eggs. We had milk cows too; I remember having to milk those cows. Everyone participated in running the farm when I was growing up -- children-- the whole family. The family was the center of the farm back then. That's why I guess I like the farm; I feel like I have roots.

LYNN: I grew up on a farm too. We lived on eithty acres and then farmed another eighty. I grew up helping my dad. As soon as dad could put me on a tractor I was hauling wheat. Back then we could get a restricted license at fourteen, but I think we fooled around with the truck before that. Once, when I was twelve, I had to drive all the way to the grain elevator with a truck load of wheat. The heavy load shifted around a lot, and I was worried that I wouldn't make it. When I got to the elevator, they put me up on a hoist, and when it came back down the truck wouldn't start. I was sweating because I was stuck, and everyone was waiting in line behind me. Eventually, I smoked it out of there. Thinking back on it, I realize that my father had a lot of confidence in me; he relied upon me to do this kind of work for him. I don't know if I could let my daughter, who is only twelve, do that.

REBECCA: I'm originally from the city. I was born and raised in Illinois, and then we moved to Salina. It was a big transition moving from a city the size of Salina to the country. We had one relative in Illinois who lived on a farm, and it was a pig farm, and I hated it. I did not ever want to live on a farm, but here I am. If my husband weren't farming, I don't think I'd be living in the country.

SHIRLEY: My mother grew up on a farm too. But when she was your age, she worked in a bank and played on a professional women's basketball team for her business in McPherson. She didn't get married until she was almost thirty. She was a

city woman for a while, and then she turned back into a farm woman.

LYNN: When I grew up it was much more relaxed; life was easier. On Sunday we'd all eat dinner, and my sister and I would wash the dishes. Everyone would take a nap, and then we'd all go out for a drive--just drive--and we'd end up in Hutchinson for an ice cream cone.

THE ECONOMICS OF FARMING

BEA: What I think has changed farming the most is mechanization, motorization. It's what happens when people want to get bigger and bigger and bigger!

SHIRLEY: Farmers don't know each other anymore.

REBECCA: Most farmers don't know their neighbors because they don't even own their own land. Most people rent, and sometimes the land owner lives and works in some far away place like California.

BEA: I know a doctor in Texas who does that!

SHIRLEY: That brings up another bad part about today's farming situation: farmers have a hard time joining together. For instance, the pig farmer wants the price of grain to be low so he can feed it to his pigs inexpensively. But the grain farmer needs for the price to be high so he can pay off his loans. It's really just a matter of having different interests. But really, I think that it would be to the advantage of that pig farmer if the grain price were high, because then the grain farmer would be paid for his efforts and the trade between them would be even. Things would probably even out if we thought this way, but we've gotten to be a selfish society.

BEA: Farming isn't that good of a livlihood. Even when Will and I were starting out we weren't making our living solely by farming. Will had to work another job during the day and "moonlight" on the farm. Most men worked off the farm then. Unless you had a real successful farm or inherited your land, why, you couldn't make it.

LYNN: Right now beef prices are pretty high, so ranching is profitable. But it doesn't always stay that way, so you need to be diversified. It's complicated. When I used to think about farming, I thought well, you just go out and plow your field. But nowadays, farmers have to know all about economics, accounting, soil types, and everything else! Farmers have to make daily decisions that are just unbelievable!

SHIRLEY: To make matters worse, farmers can't depend on the organizations which are supposed to help them. The Federal Credit Service (FCS), almost led Ed to believe that he was going under and they would foreclose if he couldn't repay he loans. He told them that <u>they</u> are the ones who are in real trouble, and that they aren't going to save themselves by calling in our dinky loans! He took all of his papers back and took his loan elsewhere.

REBECCA: Can he do that?

SHIRLEY: He did it! He couldn't believe that they are trying to make the farmers feel like it's their fault by telling them that things are worse than they are. This way those loan people can keep their big salaries and their fancy office buildings. I know several farmers who are having financial troubles. Some of them, like the ones buying great big machinery, they probably are overextended. But the really sad part is that the farmer believes that the FCS is behind him. "We're really behind the farmer; we want to do everything for the farmer." That's what the vice president of the FCS told the TV station at the tractorcade rally in Wichita. More people have to take a stand, and this includes women. We need to get involved in the rural situation, or things are going to get worse than they are.

LYNN: I guess we've been lucky. My husband has a partnership with his brother, and together they've been good managers of our money. They've been conservative, but, those who haven't been conservative have gone under. It's hard to keep track of the business aspect of farming. For instance, the partnership tax return that we had to fill out last year was so difficult that we had to have help from the K-State extension office. And then farmers have to go through these government programs where they tell you to put so many acres in this and so many in that. As it is now, I think the farm programs are beneficial, but people should eventually be weaned from them. We'd be better off.

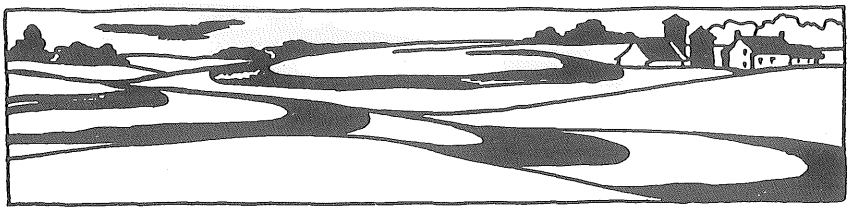
SHIRLEY: You are right, Lynn. There may have been a time when government should have stayed out of farming. There may have been a time when a good market and export system would have been enough. But now we're caught in a vicious circle; we need the government subsidies or things would be even worse. The farm program is a good idea until something better can be worked out. What that is, I don't know. Maybe it is your generation, Rebecca, that will have to get back to farming without government subsidies.

THE SOIL AND GOVERNMENT PROGRAMS

SHIRLEY: Some of these government programs are helpful because they make the farmer think about what needs to be done for the future.

BEA: Yes, I agree. The introduction of soil conservation programs was a great thing, although my dad never was for it. People back

in my dad's age thought they knew more about farming than anybody else. They wouldn't take advice from the agricultural colleges or the government. They thought their way was the only way. But I think that some of those programs really helped to make farming better. The farm next to ours started conservation practices long before we did, and I could see how their land improved. They encouraged us to start a soil conservation project on our place. We built terraces along a hillside that used to erode down into the creek with every good rain. That hillside doesn't erode anymore. Next, we planted walnut trees along the creek where the silt had collected. We never fertilized or anything, just planted 'em, and they're still growing.



LYNN: That seems like a real long-term project. You might not get to see its benefits.

BEA: We'll never get anything from it, but we took out a lot of hedgerow trees when we started, so it was good for us to put something back in to make up for them.

SHIRLEY: Ed believes in minimum tillage to retain moisture in the soil. He doesn't believe in plowing every year, but he thinks that once in a while it's necessary to plow to control the weeds. He doesn't burn, either. He thinks that burning takes some of the good nutrients out of the soil. Ed says a farmer has to use sense. He is the type of farmer who thinks of tomorrow. He knows that his land is not going to be his forever. A farmer probably knows this better than anyone else. He knows that the land is loaned to us.

THE USE OF CHEMICALS

SHIRLEY: Ed doesn't like to use anhydrous fertilizer; he says it makes the soil hard.

BEA: Will wasn't very enthusiastic about using fertilizer, either. But finally, everyone else began to use it, and he decided he'd better use it too.

REBECCA: To be truthful, without fertilizer I don't think we'd be in business. I really don't. At one of our rented sections we fertilized all but about 25 acres, and they made less than half what the fertilized acres made. Without that fertilizer, I'm not sure we would be able to make it.

SHIRLEY: We sprayed our alfalfa for greenbugs, and our neighbors did too, and between us we've effectively killed all of the ladybugs -- and they were eating the greenbugs! We've eliminated the natural process with all of our sprays. I think we're just going to have to get back to Nature's way. We're getting too modern. Some pest control is necessary, but these chemicals we're using are expensive and dangerous, and we're using too much of them.

LYNN: Yes, and think of the drift problem. We once sprayed an herbicide four miles away from the house, and now the locust trees in our front yard are dying.

FUTURE OF CHILDREN ON THE FARM

BEA: With the price of wheat down to $2 and something per bushel, it's no wonder you kids have to work off the farm. It's just too hard to make ends meet solely by farming.

SHIRLEY: With prices this low, I think the family farm is really going to be affected.

REBECCA: Bea, did either of your sons go into farming? You mentioned how they loved the farm so much.

BEA: Oh yes, they loved the farm. When we sold our farm house and moved into Salina, I think we broke their hearts. They both would have liked to farm, but we never felt that we could set them up in farming, and then they fell into other jobs. I don't think Will and I should have started farming when we did; that's what I tell the boys. We had a hard enough time living off the land during the dust bowl, but now it seems that if you don't step into land or money, there's little chance of making it. Our youngest son worked harvest with a custom cutting crew from Texas to North Dakota for five summers. He put himself through college that way. Now our sons live in Wichita and Topeka, and they both have good jobs. But they still like to go out to the farm and hunt.

SHIRLEY: Farming is something that most parents don't want their children to go into right now. It's because parents are afraid that they won't be able to set their children up properly. I've seen it time and again. The families that took their sons into farming are having the hardest times. Unless our daughter marries a farmer, we'll probably sell our farm or rent it out when we retire. Ed says you can really spin your wheels farming these days, and you really have to push the pencil. Sometimes, you do wonder if it's really worth it. My husband told our kids, "Get your college education, because no one can take that away from you, and then figure out what you want to do."

REBECCA: I want my children to get a college

education. If they decide to stay on the land after college, that's fine. Otherwise, we'll rent it out.

LYNN: Our eldest daughter plans to go to veterinary school. But after she's finished school she wants to move back here and manage her own herd. She says, "I'll have a vet clinic nearby, but I'll still work part time with my dad."

SHIRLEY: I'm happy to hear that, because I believe that most kids leave the farm because they don't see a future in it, or they don't see it as an easy way of life.

LYNN: My daughters enjoy the farm, and they appreciate the knowledge that they are getting from their dad.

SHIRLEY: The best of luck to them! I'm worried. If kids keep leaving the farm in search of jobs in the cities, our agriculture will be in big trouble. Because you know who is going to run the farms then? Guess! Corporations! And the people are going to pay up the nose for food. I'm afraid that unless our agricultural economy gets better, we're going to be searching for people who are willing to farm.

The summer ends, and it is time
To face another way. Our theme
Reversed, we harvest the last row
To store against the cold, undo
The garden that will be undone.
We grieve under the weakened sun
To see all earth's green fountains dried,
And fallen all the works of light.
You do not speak, and I regret
This downfall of the good we sought
As though the fault were mine. I bring
The plow to turn the shattering
Leaves and bent stems into the dark,
From which they may return. At work,
I see you leaving our bright land,
The last cut flowers in your hand.

from **Sabbaths**, 1987, by Wendell Berry. Reprinted by permission of North Point Press, Berkeley, California.

Attra

The new U.S. Department of Agriculture extension program managed by the National Center for Appropriate Technology (NCAT) sounds too good to be true. This service, which opened in July, is a technology transfer service to collect and disseminate information on sustainable agriculture and community resource management. The technical assistance is available to farmers, extension agents, and local governmentt officials by calling **toll-free 1-800-346-9140.**

ATTRA offers the folowing assistance for farmers:

--provides advice on lowering production inputs such as fertilizer, pesticides, fuel and water;

--recommends more efficient management practices including irrigation scheduling, crop and livestock diversification, soil conservation, and rotational cropping;

--provides assistance on economic opportunities resulting from the implementation of low-input agriculture and improved management practices.

ATTRA provides the following assistance for rural communities:

--assists with the development of businesses that can complement a more diverse agriculture base;

--recommends solutions to water, soil, and other land resource problems;

--provides information on innovative methods to reduce rural community infrastructure costs such as water and sewage treatment, and increase energy efficiency in buildings and transportation;

--provides assistance in community planning to encourage long-term sustainability in land use, food systems and economic development.

ATTRA is headquartered in Memphis, Tennessee, at AgriCenter International. ATTRA specialists receive technical questions on their toll-free hotline and respond by sending information, providing referrals, or discussing appropriate alternatives.

CONTINUED from "Prairie," pg. 18

REFERENCES

1. Daniel A. Axelrod, 1985. "Rise of the Grassland Biome, Central North America", **The Botanical Review**, 51: 2 p.164-201
2. Axelrod.
3. Philip V. Wells, 1970. "Postglacial Vegetational History of the Great Plains," **Science**, v. 167, pp. 1574-82. Also, Axelrod.
4. Johanna Gruger, 1973. "Studies on the late-Quaternary Vegetation History of Northeastern Kansas," **Geological Society of America Bulletin**, v.84, pp. 239-50.
5. H.E. Wright, 1976. "The Dynamic Nature of Holocene Vegetation," **Quaternary Research**, v.6, pp. 581-96
6. W.A. Watts, H.E.Wright, 1966. "Late-Wisconsin Pollen and Seed Analysis from the Nebraska Sandhills," **Ecology**, v.47, pp. 203-10.

In Farming, Bigger is Better— or is it?

Jess Ennis

Kansas is America's -- no, the world's breadbasket. It harvests more wheat and it mills more flour than any other state and plenty of other countries. And no other state in the U.S. raises or slaughters more cattle or produces more red meat than Kansas does, nor does any state produce more sorghum grain or silage (both used to feed livestock).[1] Just drive from one end of the state to the other along Interstate-70 and see for yourself. Kansas is vast expanses of pasture and more cattle than people; enormous acreages of green, and later, golden wheat fields and tremendous combines that can harvest an acre in a few minutes; rust-colored sorghum fields; and tall white grain elevators that pierce the treeless horizon miles ahead and announce the location of almost every town and city.

If you do drive through Kansas along I-70, you might also notice at least one billboard that displays an overflowing grocery sack, and proudly proclaims, "One Kansas farmer feeds 75 people plus you!"

There is more, however, to the current story of Kansas agriculture than is revealed by that highway sign, by the lay of the land, and by production rankings. What meets the eye is, in fact, a facade. It fools the casual observer who travels through the state. It even fools the farmers themselves and their families, and it makes victims of them.

Organizations of farm wives erected that proud sign beside the highway. Periodically, they update the number of people a Kansas farmer feeds, and they replace the old figure with a new, always higher one. In 1978, when they first erected about a dozen such signs around the state, the farm wives claimed 57 people fed, and after that, 68, and before very long they will probably change the number to 100.[2] The tragic irony is that in erecting and updating that sign, those farm wives justify, even glorify a system that threatens and often destroys their way of life.

Farms in Kansas, as in the rest of the U.S., have been growing larger, and farmers, fewer. In 1925 there were about 167,000 farms in Kansas with an average size of 264 acres. By 1986 there were about 70,000 farms in the state with an average size of 684 acres.[3] So of course the average total production on each remaining farm has increased, especially since farmers have at the same time managed to coax higher crop yields per acre of land by using chemical fertilizers and pesticides and genetically altered seed. Thus, each remaining farmer, on the average, feeds more people. But is this "progress?" Is bigger really better? Let's take a closer look.

FEEDING THE WORLD

Besides being the number one wheat-growing state, Kansas exports the most wheat overseas. In fact, according to the 1986 Kansas Agricultural Export Directory, "Kansas must market over 60% of its wheat crop overseas."[4] That highway sign might well say, "One Kansas farmer feeds 75 people FROM ALL OVER THE WORLD plus you!"

Certainly, to specialize in production and then engage in trade is the wise and practical course to take, according to the basic economic theory of trade that has remained unchallenged for about 170 years.[5] More than 200 years ago, Adam Smith, that great promoter of specialization, called upon each country to devote its resources -- land, labor, and capital -- to producing the goods it could produce more efficiently than other countries could. If, for example, the U.S. (or Kansas) can produce wheat more efficiently than Italy can, and Italy can grow vegetables more efficiently than the U.S. can, then, according to Smith, both countries will gain if each specializes according to its absolute advantage, and then trades with the other.

Then in the early nineteenth century, David Ricardo, a somewhat radical political economist of the time and a wealthy stockbroker to boot, took the trade theory a step further. According to Ricardo's theory, even if the U.S. can produce both wheat AND vegetables more efficiently

than Italy can (or vice versa), then both countries may still gain from trade if the U.S. has a comparatively greater advantage in growing wheat than in growing vegetables.

The logic of this specialization-and-trade theory is indisputable and can be consistently applied whether we are talking about the U.S. trading with Mexico, neighbor trading with neighbor, Kansas with Ohio, or Kansas with Italy. It is in fact known in economics as "the Law of Comparative Advantage," implying that to live outside that "law" is to risk suffering grave consequences. The underlying assumptions of this economic theory bear close examination, however.

Consistant with the theory, farms in Kansas (as in the rest of the U.S.) have been growing more and more specialized in their production. For most of this century Kansas farmers have increasingly devoted their resources to raising wheat, beef cattle, and sorghum, and have steadily lowered their production of vegetables, fruits, dairy cows, sheep, chickens, and eggs. In fact, the once ubiquitous farm garden, though not quite a thing of the past, is certainly less common that it once was.

FENCEROW TO FENCEROW FOR A HUNGRY WORLD

The greatest recent impetus for this kind of change in production occurred in the 1970s and early 1980s when overseas markets for American grain boomed and commodity prices soared. From 1972 to 1973 the price of wheat paid to Kansas farmers more than doubled, from $1.68 per bushel to $3.75 per bushel, and it remained at about that level through the early 1980s.[6] A hungry world was willing and able to purchase our grain. Earl Butz, the Secretary of Agriculture during the Nixon administration, will surely long be remembered for his infamous plea to farmers: "Plant fencerow to fencerow."

Butz or no Butz, the signal to farmers rang loud and clear. From 1971 to 1981, the volume of U.S. wheat exports almost tripled. In 1971, U.S. farmers devoted about 48 million acres to growing wheat, and 39% of the crop was exported. By 1981, they were growing wheat on over 80 million acres, and 64% of the crop was exported.[7] So farmers in 1981 devoted more acreage to growing wheat for export (51.3 million acres) than they devoted to growing the entire U.S. wheat crop in 1971.

Thus, during the 1970s, the amount of wheat grown in Kansas increased drastically and so did the proportion of wheat that was exported. As economic theory would have it, farm income increased substantially. Ricardo would have been pleased.

During this boom period of the 1970s and early 1980s American agriculture rode on a crest of prosperity. Many reasoned that with the world's population ever increasing, world demand for American farm commodities could only continue to grow. With such a bright future apparently ahead, many farmers borrowed heavily at high interest rates against their then highly valued land and greatly expanded their operations, buying more land and larger machinery.

Unfortunately for most farmers, however, conditions for an export-based agriculture soured. Many of the international economic, political, and social conditions which had so favored export agriculture, began to change.

-- Several important markets for U.S. (and Kansas) wheat withered away as some nations attempted to provide for themselves. Countries such as the People's Republic of China and India, which had been major purchasers of U.S. wheat, began to produce more themselves, hoping to become self-sufficient in wheat production. In 1981, Mainland China (the PRC) was by far the number one importer of U.S. wheat in the world when it purchased over 273 million bushels. By 1986, though, their imports of U.S. wheat dropped to just over one million bushels. India had imported over 50 million bushels of U.S. wheat in 1981, but not a grain in 1986.[8]

-- A world recession eroded the ability of many countries to import goods. That recession, which peaked in the U.S. in 1982, struck the world's developing countries much harder. This was especially true in most Latin American countries, who engage in a great deal of trade with the U.S. and whose economies therefore depend upon the health of the U.S. economy. As the recession in the U.S. caused a drop in the U.S. demand for Latin American products, Latin American countries were less able to purchase U.S. goods, including wheat.

-- Several large importers of U.S. farm products began to suffer severe debt problems. Mexico nearly went bankrupt in 1982 and now owes over $100 billion. Brazil's foreign debt is slightly larger than Mexico's. Peru announced in 1986 that it would no longer keep up with its debt payments. When the International Monetary Fund negotiates with these countries to make new loans or to restructure their existing loans, it always insists that they reduce their imports. Brazil's imports of U.S. wheat dropped from 110 million bushels in 1981 to 22 million in 1986; Peru's dropped from 34 million to 10 million; and Chile's, from 36 million to 6 million. Mexico imported over 38 million bushels of wheat from the U.S. in 1981, but none in 1986.[9]

-- A strong U.S. dollar made U.S. farm products more expensive abroad. In 1985, the dollar's value peaked at record levels against most other currencies. Many blamed the U.S. government's deficit spending for a stronger dollar and weakened exports. They reasoned that since the U.S. government financed its budget deficit by borrowing, this increased the demand for borrowed funds, and thus put upward pressure on interest rates. Higher interest rates in the U.S. attracted foreign investors, which increased the demand for dollars, driving up the dollar's value.

-- Many competing exporters increased their production, and their governments often subsidized wheat exports. Just as U.S. wheat farmers increased their production dramatically,

so did Argentine, Australian, Canadian, and European farmers. Through government subsidies, Argentina undercut U.S. wheat export prices by $30 to $40 per ton.[10] The European Economic Community also established wheat export subsidies.

In a matter of five years, then, U.S. wheat exports dropped by almost half, from about 1,611 million bushels to about 884 million.[11] The cash value of wheat exports dropped even more precipitously because of a drastic decline in the world price. U.S. receipts from exporting wheat fell from $7.8 billion to $2.9 billion.[12]

Clearly, when U.S. agriculture is based upon specialization and trade, the potential does exist for American farmers to benefit. But relying more and more upon specialized production for foreign markets also imposes great risks. When a Kansas farmer almost exclusively grows wheat to be sold outside the U.S., he not only must worry about too much rain during planting and harvest, too little moisture in the spring, hail, late frost, strong winds, insects, and diseases, but also about the U.S. government's budget deficit, the value of the dollar, interest rates, Japanese import tariffs and quotas, the wheat harvest in Canada, Australia, Argentina, Europe, and the USSR, Brazil's foreign debt and balance of payments, European export subsidies, and the health of the New York Stock Exchange, not to mention Hong Kong's, Tokyo's, and London's. For the specializing, exporting Kansas wheat farmer to prosper -- even to survive -- world economic, political, and social conditions must be just so.

When global events turn against specialized export agriculture, as obviously they have this decade, then farmers cannot simply readjust their production patterns accordingly. In order to profit from the greater world demand for wheat in the 1970s, Kansas wheat farmers made long-term investments in land and machinery in order to expand, investments for which they are still paying. Now in order to make their payments, farmers try to produce all the wheat that they can on every acre.

Unfortunately, when all wheat farmers feel compelled to produce like mad in order to make their payments, they all suffer in the process. Collectively, those farmers are over-supplying a world wheat market which has experienced a drastic decline in demand. As a result, the price of wheat has dropped, and so has farm income. The wise thing to do would be for all wheat farmers at once to cut back their wheat production in order to curtail the over-supply and to raise the price. Since, however, each individual farmer produces an insignificant share of the whole U.S. wheat crop, no one farmer can affect the price of wheat even if he completely stops growing it. Likewise, he cannot affect the price if he produces all that he possibly can.

In order to chip away at the mountains of surplus wheat now being produced each year, farmers would have to cut their production collectively. The federal government has tried various schemes, all designed to encourage a collective drop in the production of wheat (as well as other commodities). Despite those programs, however, and despite a drop of nearly one half in the volume of U.S. wheat exports (1981-1986), Kansas farmers actually harvested more wheat in 1986 (337 million bushels) than they did in 1981 (303 million bushels).[13] The over-supply of wheat and of many other farm commodities has remained a chronic problem.

GET BIG OR GET OUT

Exports aside though, hasn't it been essential for farmers to expand their operations in order to become more efficient? It is, after-all, important for us as a society not to waste our scarce resources. Ask the typical agricultural economist and, almost by reflex, he will undoubtedly draw a downward sloping cost curve that finally levels off at some large scale of production, indicating that the average cost of producing each bushel is lowest when the operation is large. "Economies of scale," he will announce, along with, "efficiency," and "economic imperative."

Those particular economies of scale that he so deftly illustrates are not, however, ordained by Nature herself, just as Nature commands the Sun to rise in the East and to set in the West. And there are plenty of costs that he does not include in his accounting, or even mention, costs that perhaps the farmer himself does not pay, but that someone pays, often dearly.

To a great extent, the industrialization of American agriculture has been the result of active public policy aimed in that direction. As a result of federally funded research, mostly conducted at the publicly supported Land Grant universities, large-scale, capital-intensive technologies have been developed. Government funded extension services have then promoted their use. The federal tax structure further encourages large-scale production and mechanization. Thus, many of the existing economies of scale are artificial and are the result of public policies which promote large-scale production.

That large-scale production, because it depends upon heavy mechanization, specialized cropping, chemical fertilization, chemical pest-control, and petroleum, imposes other costs which the farmer himself bears only partially or not at all. Nitrates from chemical fertilizers and confined livestock feeding operations run into rivers and leach into groundwater. So do certain agricultural pesticides. In Kansas, where underground sources contribute 85% of the water used in the state, agricultural chemicals often contaminate groundwater.[14] No one knows for sure what levels of contamination are "safe" for drinking. The long-term health effects are especially elusive to measure.

Another real cost which eludes measurement is from the loss of topsoil, that thin life-giving layer. More commonly than not, the practice of heavily mechanized, large-scale monocropping rapidly erodes our topsoil and thus threatens our ability to produce food, now and in the future.

The problem with these external costs (to present and future generations) resulting from large-scale farming is that they are, first of all, difficult to measure physically, and then almost impossible to measure monetarily. The economist, who measures everything in dollars, finds it difficult to incorporate into his accounting these very real costs to society. It is much easier to compute a farmer's expenses for fertilizer and the like. The analysis is much cleaner. The economist usually, therefore, stops right there.

Suppose that he did not stop there, however, as he certainly should not. Suppose he accounted for the less measureable but, nevertheless, serious costs of large-scale farming in his tally. If he were to include those costs, the "efficiency" of large-scale farming would erode right along with the soil.

--BUT OFTEN NOT HIMSELF OR HIS FAMILY

Specialized, large-scale agriculture also imposes upon farm families and their communities other costs which cannot be measured in dollars. For example, how can one put a price tag on what it means to thousands of farmers every year to lose the farms that had been their parents' and grandparents'? And what is the value of the very existance of rural communities? Farmers have all along been the life-blood of rural American towns, but those towns now wither and die as farmers disappear from the land or struggle desperately to hang onto it.

As bad as circumstances were for farmers during the Great Depression of the 1930s, in some ways farmers are worse off today because they have specialized for the sake of efficiency. During the Dust Bowl days of the 1930s, individual farms, although much smaller than today's, produced a greater variety of goods, which the farm families themselves could consume. Today though, on a 1,000 acre wheat farm the members of that farm family are completely entrenched in a market system. They sell all that they produce in the market and buy in the market all that they consume, even their bread. Thus, on a completely specialized farm, the vicissitudes of the market for one crop affect even what is on the farmer's dinner table.

Those farmers who struggle to hang on during these times of unfavorable markets are now often the victims of a cruel irony. Sometimes the families of Kansas farmers, those same people who feed 75 people plus you, themselves actually suffer from hunger and malnutrition.

According to a recent New York Times article, "hundreds of farm families in Kansas, and thousands of others scattered across the Midwest...are grimly holding off bankers and creditors, and hanging on to their farm by doing without basic needs, including food."[15] The same article quoted a rural food pantry coordinator as saying that farm children are showing signs of malnutrition, such as abscessed baby teeth and goiters. One Kansas farmer may be feeding "75 people plus you," but apparently not always himself or his family.

One Kansas farmer may be feeding "75 people plus you," but apparently not always himself or his family.

EAT WHEAT AND MEAT

Is the solution to the American farm crisis somehow to invigorate the markets for American farmers' goods? After all, when the world seemed eager to buy our wheat and corn, American agriculture appeared to be healthy, at least much healthier that it is today. Maybe all that we need to revive our failing agriculture is a bit of good old American salesmanship.

Since we do not seem able to stop gushing forth with a continuous flood of wheat, corn, and other commodities, we are indeed calling upon salesmanship to boost the markets for those goods. An entire branch of the U.S. Department of Agriculture, the Foreign Agriculture Service, (FAS) devotes itself to developing overseas markets for American farm products. "Eat wheat," the FAS tell rice eaters, and it spends millions of tax dollars each year to promote the message.

Similarly, the state of Kansas this year sent to Japan a contingent of young, attractive women, including Miss Kansas, herself, to convince the Japanese to eat Kansas beef. Dressed in mini-skirted cowgirl costumes, they went from supermarket to supermarket with their message.

"Agriculture needs a healthy, dependable export market if we are to pursue a policy of full production on our farms," according to the 1986 Kansas Agricultural Export Directory.

But surely this is putting the cart before the horse. It is a bit like the Herald Times Journal printing mountains of the daily edition, as many as they possibly can, and then sending paperboys out knocking on doors, even in non-English speaking countries, trying to sell them all. This is no way to run a newspaper or agriculture.

The culprit in the whole calamity of American agriculture is our obsessive belief that bigger is better. First we must recognize that it is not, that we pay dearly for bigness. Then, just as we have actively promoted specialized, large-scale farming, we must, for the sake of the economic and environmental well-being of our agriculture, actively promote diversified, smaller-scale farming.

One Kansas farmer feeding more and more people is a symptom of illness in our agriculture rather than a sign of its improved health. When the "One Kansas farmer..." sign becomes no longer necessary as a declaration of pride and finally disappears from the landscape, then that will be a sign of progress.

REFERENCES AND NOTES

1. All rankings from **Kansas Farm Facts, 1986: Kansas Agricultural Statistics**; USDA National Agricultural Statistics Service; and Kansas State Board of Agriculture, Division of Statistics, 1986, pg. 3.
2. Telephone conversation with Jeanne Mertz, President of Kansas Agri-Women (formerly United Farm Wives of America), November 1987.
3. **Kansas Farm Facts**, 1986, p. 97.
4. **Kansas Agricultural Export Directory**, March 1986.
5. Dominick Salvatore, 1975. **Theory and Problems of International Economics**, Schaum's Outline Series (McGraw-Hill Book Co.) p. 2.
6. **Kansas Farm Facts**, 1986, p. 102.
7. USDA ERS, **Agricultural Outlook**, May 1985, p. 4.
8. U.S. Dept. of Commerce, Bureau of the Census, Schedule E: Commodity by Country-domestic merchandise, **U.S. Exports**, Dec. 1986 and Dec. 1981.
9. **U.S. Exports**
10. **Agricultural Outlook**, p. 8.
11. **U.S. Exports**
12. **U.S. Exports**
13. **Kansas Farm Facts**, 1986, p. 15.
14. Kansas Dept. of Health and Environment, **State of Kansas Groundwater Protection Strategy**, Jan. 1987, p. 1
15. **New York Times**, Sept. 29, 1987.
16. **Kansas Export Directory**, March 1986

How to Avoid Building Pyramids

Wes Jackson

The human race was born out of nature and it is out of nature that the human race and all life is sustained every second of every minute of every hour. This has to be our beginning point in thinking about the different economic orders that now exist on the earth. It turns out that neither of the two dominating economic ideologies, neither capitalism nor Marxism, is fit for our planet. Fundamental to both of these nearly identical twin orthodoxies is a barbaric plunder of nature. Marx especially was explicit about this. He saw this plunder as necessary and inevitable if progress is to be made toward a better world for humanity. He endorsed this plunder wholeheartedly, perhaps because he was a city boy who believed in "historical necessity."

He also believed that economic laws were as immutable as physical laws. (Perhaps the laws are immutable, but the assumptions or variables we plug into the equations are not.) He was a devotee of the idea of centralist planning, with little concern for the consequences to the periphery. It wasn't just nature that had to be sacrificed in the name of human progress. Native cultures were to be sacrificed too, for they were mere anachronisms. Historical necessity meant that the destruction of these cultures was inevitable during the creation of the material basis for civilization. For example, he commented once that England had a double mission in India: Destroy the old Asiatic society, and in turn lay the material foundations of Western society. (To his credit, Marx did recognize the finitude and value of the soil. He wrote that "all progress in capitalistic agriculture is a progress in the art, not only of robbing the laborer, but of robbing the soil.")

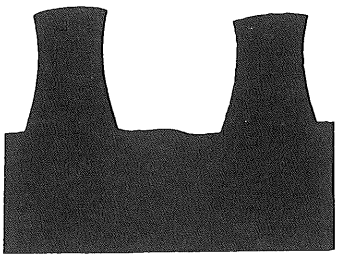
Couple Marx's materialistic view of nature with the notion of John Maynard Keynes, the architect of modern capitalism: "Foul is useful and fair is not," said Keynes. "We must have foul a little longer." He meant that we must use greed and envy in order to open up the mines and wellheads and get the raw materials for consumption spread around the earth. When there is enough for everyone, then we can suspend greed and envy.

To suggest that someone of Keynes's intellect and stature was being naive or silly somehow seems inappropriate, but this idea of using long-recognized vices of humans to plunder the planet until some time when we will suspend these vices at will seems just that: naive and silly. It is also dangerous, for giving a green light to exercise traditional vices will mean that many will suffer in the long run for the benefit of a few in the short run.

Marx has had his impact, for we have come to act as though economic laws are as immutable as physical laws. The problem is, we often

confuse our assumptions with the laws. Even environmentalists who should know better think they are using economic arguments to support their case. No economic system exists by itself. Rather, any economic system is the consequence of the collective values of the culture. Change the values and you change the system. Take one extreme example. Most humans desire gold; therefore gold has value. If no one wanted gold, it would be worthless. More importantly, because humans have a penchant for gold, cultures have worked out many different ways to allocate that gold to meet some desired end. Though the Aztecs shaped gold into beautiful coins and figures of adornment, the conquistadors cared only about the marginal value of the gold, so they melted down many of these works of art. They cared not a whit for the add-on value assigned by the native cultures.

I am making such a fuss about all this because to call the assumptions "laws" and then to treat them as immutable as the laws of physics does us a disservice. On the one hand, it makes us feel that changing human values is pointless; on the other, it makes us overly optimistic in hoping that the market might destroy the possibilities of building nuclear power plants. This religious faith in economic determinism keeps us from discussing the ultimate consequences of centralized planning and power delivery. Just as important, it keeps us from confronting and enlarging our own values.



Hundreds of Kansans knew that economics did not support the Wolf Creek nuclear reactor that recently went on line in Kansas. It is a matter of record that we foresaw nearly every step of the scenario years before it was played out. We predicted the horrendous cost overruns during construction. We predicted that the utilities would want to pass on the cost of their stupidity in planning to the customers rather than to the stockholders. We feared that the Kansas Corporation Commission would probably cave in toward the end and bail out the utilities that had overestimated how much power was necessary for the future. Watching the inevitability of it all was like watching a dramatic tragedy unfold on the stage. It was devastating for all of us who opposed the monster, but many important things happened during the fight. We formed an alliance with protesters in other states. We learned even more about the diseconomies of nuclear power and became radicalized about the nature of our economic system. We realized that humans in high positions were no smarter or wiser than we. We learned that we have to work harder to elect better representatives. We learned what it means to have a politically ambitious governor. We learned that we have to have more ecologically aware corporate commissioners.

Some people say that nuclear power will die under its own weight, that the market will not support the building of nuclear power plants. For the moment, this is true, in this time of abundant coal and oil and natural gas, and a smattering of solar installations. In this interim, our challenge is to begin to teach, experiment, and think hard about running this culture on sunlight, for if we fail in this task, then any number of cultural arrangements and numerous forms of political suppression will be put in place by those who support the idea of "historical necessity." According to Herodotus, the pharaohs enslaved and persuaded tens of thousands of people to build pyramids to house dead kings. In the twentieth century, we "objective" observers might regard pyramids as stupid projects and wonder how so many people could be organized to pile so many stones in one place. Apparently numerous off-season Egyptian farmers would join the labor force for pyramid construction, partly for religious reasons. Several of the people, at least, believed that their immortality was hitched somehow to the immortality of the pharaohs.

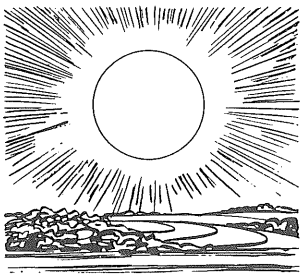
Suppose that thousands of slaves, though they may have been "unbelievers," acknowledged the economic necessity of their work: if they wanted to eat, they had to keep piling on the rocks. While this may have been an acceptable religious goal, it was certainly a terrible social goal. Those pyramids are the result, in large measure, of the vision and will of a few elite kings and priests.

Where was the market in the pharaohs' time? Exactly where it is today--serving "necessity." Whether an economy serves the necessity of a religious hierarchy or the necessity of the stockholders in Kansas Gas and Electric is an incidental detail. In neither case is it serving the necessity of the people.

And so where is the culprit and how do we begin to manage our exodus from the somewhat benign tyranny of modern-day primordial pharaohs? I think that we begin by repudiating the capitalistic and Marxist notions of historical necessity. The pharaohs built pyramids and the utilities, nuclear power plants. Both were and are devotees of centralized power generation and delivery. Whether this power is political power or electric power is unimportant for the two are so closely tied. Ultimately then, the battle is between the centralists and the peripheralists.

By centralists I mean those who favor centralized control, centralized planning and centralized dispersement of services. The peripheralists, or decentralists, prefer greater control over their local economies and greater dependence on community loyalty. They are what E. F. Schumacher calls "homecomers." They want to be connected to the land, not just owners of it or extractors from it. Their resilience

comes from a sufficiency of people. If we are serious in our pursuit of a sun-powered culture, then we must spell out the differences between the loyalties and affections of the centralists and the peripheralists.



We have to begin with a basic reality: we're talking about a sun-powered culture. Sunlight falls in a dispersed manner over the surface of the earth. There is an optimum radius which defines the circle over which sunlight can be organized for human use for various purposes. The area of that circle and the number of people in it depends on local conditions of soil, rainfall, temperature and humidity. That optimum radius or area and the optimum number of people in each place can define our local politics as it has defined the politics of native cultures in the past, and as it defined the establishment of rural culture following settlement in America. The model for this new economic order has not been worked out, but it is now in the making. The people at work on this new order will generally mistrust the centralized planning that homogenizes both landscapes and people. They will acknowledge that the human race was born out of nature and that it and all life are sustained by nature every second of every minute of every hour. They will acknowledge that it is a terrible and cruel lie that we must plunder nature in the name of historical necessity or to satisfy the demands of the market. They will acknowledge that native cultures and rural communities are not anachronisms and that their destruction need not be inevitable. They will understand that because these cultures are peripheral they have likely accommodated themselves to living locally and thus constitute a source of information for how to live in a dispersed manner on a sun-powered planet. Finally, they will see that to use the vices of greed and envy in order to achieve some short-term economic benefit is a kind of immorality. To institutionalize these vices amounts to an immorality of culture that will not be easily abandoned. We must call these vices what they are, refusing to allow them to be used as levers for some "ultimate good" as a matter of "historical necessity."

This article has been reprinted from **Altars of Unhewn Stone: Science and the Earth**, by Wes Jackson (Northpoint Press, 850 Talbot Avenue, Berkeley, California), 1987 with the permission of the author and publisher.

Should Japan Import Rice?

Veronica Mecko-Ray

The problems associated with large-scale, machine-oriented farming are becoming evident here in the United States: water pollution, erosion, loss of fertility in the land, and the collapse of rural communities. The farm crisis--in its cultural, agricultural and ecological dimensions--has been felt strongly here, but we are not alone. The pattern exists in many countries. As we in the U.S. work toward preservation of our family farms, we should also be aware of how U.S. policy may affect small-scale farming in other countries. Japan, for example, may soon experience a 90% drop in the number of rice farms. The pressures which may bring about such a drastic change come from forces inside Japan and from the U.S.

Japan, best known as a successful manufacturing nation, is also a successful producer of food. In fact, Japan has been able to maintain self-sufficiency in rice, a food which supplies 30% of the average Japanese person's caloric intake.[1] This rice is grown on 2.6 million farms, which have an average size of less than one hectare (2.47 acres).[2] Self-sufficiency and small-scale rice growing have been maintained in Japan through high consumer prices and through such government policies as subsidies for farmers and import bans. For many years, however, Japan has been pressured to lift bans on rice imports and initiate trade liberalization. Because of the structure of Japanese agricultural policy, the future of Japan's small-scale rice growing seems to hinge on one question: will Japan liberalize its trade policy and begin importing rice?

U.S. Wants to Sell Rice to Japan

The U.S. has had long-standing frustrations with Japan's import bans on rice and quotas on other agricultural products. As of June, 1987, the U.S. had taken Japanese quotas on twelve agricultural products to the General Agreement on Tariffs and Trade (GATT) for international ruling on their legality.[3] The rice import ban was not included in this agenda; however, the rice issue is likely to be brought up soon through pressure by the U.S. Rice Millers Association (RMA). The RMA is determined to have an open rice market in Japan. In September of 1986, the RMA sought compensation for Japan's rice import bans through the office of the U.S. Trade Representatives. The petition was rejected, but the U.S. Trade Representatives agreed to include the rice issue in the upcoming Uruguay Round of multilateral trade negotiations.[4]

The RMA and the U.S. government do not demand total liberalization of rice imports; what frustrates them is that Japan buys no U.S. rice. In April of 1987, U.S. Agriculture Secretary Richard Lyng presented a request for partial liberalization, that is, token imports.[5]

The U.S. has a variety of motives for selling rice to Japan, some for its own good and some supposedly for Japan's good. For several reasons, though, it seems unwise for Japan to import rice from the U.S.

The U.S. pressures Japan because it needs an international market to reduce its rice surplus. But Japan also has a surplus of rice. In fact, in 1987, 770,000 hectares out of a total of 3 million hectares of rice paddies in Japan lay fallow in a move to cut down on surplus rice.[6] Furthermore, Japan is already greatly dependent on agricultural exports from the U.S. and other nations. Calorically, Japan imports 1,200 calories of the 2,600 calories per person of the daily food consumption.[7] The U.S. is Japan's largest single supplier with U.S. agricultural exports accounting for 37% of Japan's food imports.[8] (Agricultural imports from the U.S. include wheat, corn, cotton, avocados, and soybeans.) It seems greedy and unjustifiable that the U.S. would expect Japan to help reduce the U.S. rice surplus when Japan can't manage its own surplus and, in addition, already imports so much from the U.S.

The Reliability of a Rice Supply

Appealing to Japan's best interest, the U.S. states that its rice is cheaper than Japan's rice. This is a true statement; Japanese consumers pay as much as five times the international price for rice.[9] However, since rice is the staple food, Japan must consider the reliability of a rice supply. Cheap rice from the U.S. may be an unreliable supply for several reasons. First of all, the U.S. rice is highly subsidized. In 1985, rice subsidies came to 77% of the gross value of the total rice production.[10] These subsidies have already been under fire in the U.S. If subsidies were cut off to rice farmers, there could be a reduced supply or no supply for exports. Secondly, Japan has already experienced unreliability of imports from the U.S. In 1973, the U.S. enacted a soybean embargo which particularly affected Japan. It had bought 98% of its soybeans from U.S. suppliers. For several months all soybean exports were suspended, and then partial exports were allowed. As a result of the embargo, Japan took action to decrease dependence on U.S. soybeans. Japan began producing more soybeans domestically and it began importing soybeans from Brazil.[11]

Since Japan is already highly dependent on agricultural imports, and because rice imports from the U.S. may be unreliable, it would seem to be in Japan's interest to maintain rice import bans. Recent news from Japan indicates that the rice import issue will not be resolved in the near future. For the time being, another issue, a reduction of producer prices paid to farmers, has diverted some attention from imports.[12] Nevertheless, the issue continues to be debated by domestic groups. Besides their disagreement on rice imports, these groups also have different visions of what Japanese rice growing should be.

Making Japanese Rice Production "Efficient"

A predominant vision of those who now advocate trade liberalization, mainly Japanese economists and major industrial groups, is of the rice growing "industry." The culmination of this vision is that Japan could be an internationally competitive exporter of rice without reliance on import bans or subsidies. The greatest hindrance to the growth of this rice industry is high production costs. Advocates believe that open rice markets (i.e. imports of cheap rice) would force farmers to be more efficient in order to remain competitive. Advances in biotechnology will help reduce production costs through new, higher yielding plants which require fewer inputs.[13]

The first step toward increasing efficiency and utilizing new technologies--as envisioned by these economists and industrialists--will be an increase in farm size. One economist from Chiba University in Japan proposes that production costs could be halved by increasing the average farm size from one hectare to fifteen hectares. Such an increase would eliminate 2.45 million of the present 2.6 million rice farms.[14] As the economist points out, farm population would then decline sharply. This kind of decline would be in keeping with the demographic trends of the last 40 years: after World War II, 70-80% of the people in Japan were on farms, but today the figure stands at less than 14%.[15]

Keeping Traditional, Small-scale Rice Farms

The Central Union of Agricultural Cooperatives (Zenchu) argues against trade liberalization of rice. They view rice as something more than a market commodity; rice has been the staple food crop of Japan for at least 2,000 years. The rice paddies are also important because they provide certain environmental benefits. In mountainous areas, rice paddies help prevent flooding and soil erosion. The Zenchu fears that if cheap rice is imported, many paddies would be abandoned and environmental benefits would be lost.

The Zenchu believes Japan should maintain self-sufficiency in rice. As a part of this goal, however, they realize that production costs must be reduced and they have taken measures toward reduction. The Zenchu organizes people from family run farms to work in group-managed farms. Some of these farms have realized a 50% reduction in production costs. Also, last spring the Zenchu expressed agreement to a cut in the producer price paid to farmers.[16]

Masanobu Fukuoka is a small-scale Japanese farmer who advocates traditional, natural farming. He argues against imports of staple foods because Japan's self-sufficiency is jeopardized by imports. He uses the example of wheat imports to show how Japan easily became very dependent on a cheap import. After World War II, Japan began importing cheap wheat from the U.S. The Japanese government urged farmers to stop growing barley and rye (two traditional winter crops which were planted after rice was

harvested) as well as wheat because U.S. wheat was so cheap. As a result, from 1960 to 1983 Japan fell from being 100% self-sufficient in barley and rye to 15%, and wheat is now a large agricultural import for Japan.[17] If patterns of the past hold true, then rice self-sufficiency could be jeopardized by imports. Mr. Fukuoka believes that the more people that farm the land, the better for Japan. If more people could grow food for themselves, then many imports would not be needed.

The question--should Japan import rice?--will be difficult to answer if productivity, efficiency, self-sufficiency, economic power, and small-scale farming are all given equal weight. If economic power and efficiency are valued as highly as they are in the U.S., the answer clearly will be to import rice, even though many farmers may be forced off their farms. But if, in contrast, small-scale farming and self-sufficiency are recognized as culturally and agriculturally valuable, a different answer will become clear: Japan should not import rice.

References and notes

1. Iwao Yamaguchi, "Rice Wars?: Maintaining Japan's Self-sufficiency in Rice", **Journal of Japanese Trade & Industry**, No. 2, 1987, p. 40.
2. Yasuhiko Yuize, "Japanese Agricultural Policy," **Journal of Japanese Trade & Industry**, No. 5, 1987, p. 51.
3. Darryl Gibson, "Uniqueness stands in the way of change," **Far Eastern Econ. Review**, June 11, 1987, p. 62.
4. Yamaguchi, p. 40.
5. Yuize, p. 52.
6. Yoshikazu Kano, "Rice Wars?: Toward an Independent and Healthy Agricultural Industry," **Journal of Japanese Trade & Industry**, No. 2, 1987, p. 41.
7. Yuize, p. 49.
8. Yamaguchi, p. 40.
9. Bruce Roscoe, "Soyabeans come home to roost in Japan," **Far Eastern Econ. Rev.**, Sept. 11, 1986, p.161.
10. Yamaguchi, p. 41.
11. **Trade: U.S. Policy since 1945**, 1984. Congressional Quarterly Inc., (Washington D.C.).
12. Charles Smith, "The Price of Rice," **Far Eastern Review**, July 16, 1987, p. 22.
13. Yuize, p. 50-52, and Kano, p. 40-42.
14. Yuize, p. 51.
15. Masanobu Fukuoka, 1978. **The One-Straw Revolution**, (Rodale Press, Emmaus, PA), p. 108.
16. Gibson, p. 62, and Yamaguchi, p. 42.
17. Fukuoka, p. 105-109, and Yuize, p. 50.

After First Heavy Frost, October, for Thom Leonard's Garden

Roger Lebovitz

Then let your harvest be frost
at the season's finale:
Let the leaves blacken and fall,
enfolded by earth.
Frozen in the senses of cold,
let the stillness take its course.

The Crisis in Black Land Ownership

Perdita Butler

In 1910, at the peak of black land ownership, blacks were the full or part owners of fifteen million acres of land. The black population at this time was 9.8 million. By 1970, when the black population was 22.4 million, blacks owned less than six million acres.[1] Since then the decline of black land ownership has continued, and the black population is abandoning the rural sector more rapidly than the white population. This has special significance for a people whose history in the U.S. has been intimately interwoven with the land. In 1982, the Commission on Civil Rights critiqued the policies of the U.S. Department of Agriculture which contributed to the exodus and predicted the extinction of the black farmer by 2000. What will happen to a black people if it loses its land base?

The History of Black Land Ownership

In the 1860's and 1870's the black population in areas of Georgia and Alabama increased by twenty-five percent. Many blacks left the mountain and Piedmont counties and relocated in the Blackbelt, heart of the cotton country.[2] Blacks had "expected the plantations of their ex-masters to be divided among them," but their expectations of the reconstruction were not met.[3] Black slaves became black sharecroppers, and the whites still owned the land. Sharecroppers had more independence. They could grow their own food without interference, and often thought themselves in partnership with their former masters. But as a means of extracting surplus value from black labor, sharecropping was a superior system to slavery. Not only did sharecroppers pay with half their crop, they also bought seeds, tools, and household items from the planter on credit at outrageous prices. By 1880 a whole class of middlemen merchants had arisen, and in Georgia, for one pound of bacon and one bushel of corn paid for four months after the initial purchase, they were charging interest rates of 88.9% and 92.8% respectively.[4]

During this same time a determined group of black ministers, entrepreneurs, and educators pooled their resources to begin savings banks. These black banks and black lending institutions changed the poverty of black life in the South. Sharecroppers began buying land. By the end of the 1880's economic self-sufficiency and the establishment of a black land base became an ideological imperative in black thought. This is reflected in the existence of 175,000 black owned farms, 43,000 partially owned farms, and 670,000 sharecroppers, covering fifteen million acres of land in 1910. In addition to black owned land, there were seven black owned banks in Alabama, two in Georgia, eleven in Mississippi, and 42 others around the country.[5]

Along with World War I in 1914 came the decline of black agriculture. European markets closed for three months, and cotton was sold at bottom prices (five cents in 1914 as compared to eleven cents in 1890, and 29 cents in 1868).[6] Although southern politicians recognized the crisis and set up assistance to farmers, most of the assistance went to white farmers. Due to the drop in cotton prices, the only black lending institution left was Tuskegee Institute. In addition to the war and the price fall of cotton, the boll weevil struck the south. By 1916 every county in Alabama was infested. Blacks could not control the insects without costly pesticides. The white southern farmers began to diversify by investing in livestock, but black farmers did not have the necessary capital, nor could they obtain it.

Paralleling these events was a breakdown in race relations. After 1900 the political groups in the South (whether Democratic, Populist, or Republican) repudiated the principle of black suffrage. For all practical purposes the Fifteenth Amendment no longer existed in the Blackbelt.[7] Jim Crow laws were rampant, and in 1915 there were eighteen lynchings in Georgia alone.[8] Many blacks abandoned their homes and farms in the South.

The continuous migration of blacks to urban areas and off the land began after 1910, although it accelerated during World Wars I and II, and decelerated during the Depression. The Black Economic Research Center describes the war years as "pull" periods, which stimulated migration to the North through employment opportunities and homes there. The 50's and 60's were "push" periods, during which black farm labor became surplus due to the mechanization of agriculture and the set aside programs. Daniel Fusfeld states that "the roots of today's crisis are to be found in a transformation of Southern agri-culture which culminated almost twenty years ago."[9] He maintains that as tractors and cultivators replaced men, sharecropping died out, and black farm workers were pushed to southern cities, leaving only seasonal work. Then in 1950 as machine harvesting of cotton and corn was introduced, "disaster struck." Not only the farm laborer and tenant were subject to the changes; the black farmer, whose average farm size was 47 acres, had neither the capital nor acreage to warrant big machinery, yet he soon discovered that he was not able to compete without it.[10]

Black Land Ownership Today

Today blacks comprise four percent of U.S. farm residents.[11] Between 1970 and 1980, the black farm population decreased 65% as compared to a 22% decline in the white farm population over the same period.[12] Of those blacks who remain farm residents, a disproportionate amount are wage earners rather than self-employed. Out of 1.7 million farm residents employed in agriculture, approximately 63% are self employed, 20% are employed for wages and salaries, and 17% are unpaid family workers; however, among black farm residents employed in agriculture only 27% are self-employed, 67.5% are wage earners and 5% are unpaid family workers.[13] Of all black farmers, 85% are located in Mississippi, N. Carolina, S. Carolina, Texas, Alabama, Georgia, Virginia, Tennessee and Florida.[14]

Currently black farmers and land owners are leaving or losing the land because of "economies of scale," institutional discrimination, and legal and illegal seizure of land by whites.

Cause of Black Land Loss: "Economies of Scale"

While the average black farm consists of 128 acres, the average white farm is approximately three times that large at 428 acres.[15] The emphasis of agricultural research at the land grant agricultural schools, established under the Morrill Act of 1887, has been and still is toward crop specialization and large-scale operations to maximize efficiency. Farmers have been encouraged by tax benefits and inexpensive oil, as well as by the universities, to purchase the latest in big equipment and technology. Research which is directed at large-scale farming, combined with government price and income support programs, places small farmers, including most of the black farmers, at a competitive disadvantage. The "economies of scale" benefit the big farms and force small farmers out of business.

Cause of Black Land Loss: Difficulty in Obtaining Credit

If a farmer has to expand to stay economically viable, then he must do so using borrowed money. This is where the black farmer reaches the bottleneck. Black farmers and landowners have difficulty obtaining credit. Insurance companies require extremely large minimum loans. Commercial banks make smaller loans but have too short of a repayment period. Federal banks require more collateral than most black farmers can afford. Moreover, all financial institutions, particularly in the South and including the Farmers Home Administration, have a reputation for discriminatory practices.[16] "Displacement of black operators on large farms, though less than on small farms, was high enough to make one suspect that inability to acquire capital was more important than farm size in determining the black survival rate in agriculture."[17]

The Farmers Home Administration (FmHA) has been in a unique position to help black farmers. Historically the FmHA was created to provide financial support for those unable to obtain credit elsewhere..."a lender of last resorts." This is a social function that distinguishes the FmHA from commercial lenders that operate to minimize their financial risk. This role of the FmHA was reinforced by Congress in 1978 when it authorized the FmHA to make "limited resource loans," with special terms and conditions to low income farmers, minorities,

The FmHA, which has the unique role to preserve and enhance the livelihood of farmers, has not given adequate attention to the crisis black farmers face today.

and women who have had difficulty in the past obtaining credit. These limited resource loans specifically identified black farmers as among those who would benefit from the program. Furthermore, the U.S. Department of Agriculture (USDA) report stated that "the public interest is not served by subsidizing farms that are larger than necessary to be efficient," and that "the subsidies could be better spent helping small farmers, minorities and others increase their stake in society by gaining access to land."[18]

Despite the fact that the FmHA was given the responsibility to be the "lender of last resort" it has increasingly become a lender for farmers with large assets. Although FmHA traditionally served the family farm, a 1978 amendment to the Consolidated Farm and Rural Development Act extended the eligibility for FmHA loans to private corporations, cooperatives, and partnerships, if they are controlled by family farmers engaged primarily and directly in farming or ranching. The intent was not to reach out to non-family farms but to "bring eligibility requirements more in line with the current trend, whereby farm cooperatives, partnerships, and corporations are established to operate family size farms and ranches."[19]

But the regulations intended to implement the goal leave room for a wide range of subjectivity. Often farmers who were not in greatest need and who could obtain funding elsewhere were the recipients of FmHA loans. Some sought financing to expand their agricultural operations, while taking advantage of inflation, technology, and tax benefits.[20] In 1979, disaster loans were made to multimillion dollar farm establishments, and of the total dollar amount loaned by the FmHA in 1981, only 2.5% went to black farmers.[21]

FmHA regulations do not require outreach, but the USDA Administration Regulations state that "each agency head is responsible for making sure that all eligible persons, particularly minorities and women, are adequately informed and encouraged to participate fully in USDA programs." Moreover the practices of the FmHA not only lack outreach, but actually discriminate against black farmers. In 1980, 113 of 198 total complaints filed against the FmHA, alleged racial discrimination.[22] Complaints filed by black farmers in North Carolina included disrespect, embarrassment, and humiliation, by FmHA officials as well as complaints of discriminatory legal practices. A few of the most common discriminatory practices engaged in by the FmHA personnel are listed below:

--inordinate waiting periods between application and loan approval for blacks,
--absence of deferred loan payment schedules for blacks,
--black farmers receive loans that are only a portion of the demonstrated need while white farmers receive 100% of their demonstrated need,
--disparities in the number of loans and the amount of the loans made to blacks,
--loans to lease land are denied to black farmers; moreover they are encouraged to discontinue farming and sell out,
--requirements that blacks agree to voluntary liquidation as a condition for obtaining loans.[23]

The FmHA is a highly decentralized agency, and the county offices are the primary point of contact between rural residents seeking FmHA assistance. It is at the county level that individual loans are approved or disapproved. Committees that are staffed with persons who are biased against black farmers are incapable of objectively evaluating their loan applications. The number of black committee members declined drastically between 1979 and 1980. For example, Tennessee's black membership declined from 33 in 1979 to 2 members in 1980; Georgia's declined from 61 to 14; Mississippi's, from 48 to 21; and Alabama's, from 37 to 19.[24]

The FmHA, which has the unique role to preserve and enhance the livelihood of farmers, has not given adequate attention to the crisis black farmers face today. Even programs specifically targeted at minorities have not been administered so as to help black farmers.

Cause of Black Land Loss: Land Seizure

Blacks are losing their land today by another means which also has its roots in the history of the post-bellum south: through the legal and illegal seizure of land by whites and corporations. Black land is lost at tax sales, partition sales, and foreclosures. The custom among blacks in the South of not writing wills makes the land easy prey to the afore-mentioned practices.

The tax sale is properly the taking of delinquent property by the state and auctioning it off to the highest bidder. Generally there is a public notification as well as notification of the owner. Anyone is permitted to bid on the property, but the owner continues to have title to the land for a prescribed time. During this time he can redeem his property by reimbursing the purchaser, plus interest, penalties, and any other legal cost. If the purchaser makes improvements, the owner must also reimburse him for that. Often the purchaser rushes to make costly improvements in order to bar the owner from redeeming his land. Only the amount of property necessary to cover the tax is supposed to be sold, but in practice the entire property is often sold. Thus, taxes in the South being quite low, substantial amounts of land are offered for sales taxes less than $100. It also occurs that black landowners lease their

land to white tenants with the understanding that the tenants will pay the taxes. They do not pay them, and then later they acquire the land cheaply at the tax sale.[25]

If a black landowner dies without a will, which occurs frequently, the land becomes the property of heir. All heirs have an undetermined interest in the property, and the title becomes unclear. Nothing can be done with the land without the consent of all heirs. If one heir wants his or her cut, the land becomes subject to partition sales. The property size and the number of heirs usually makes it impossible to divide the land. Instead the land is sold and the proceeds are divided. At these sales only persons who will purchase the complete property have access to the land, so the land is usually lost by the black family to white owners. Moreover, there are usually few bidders and the land is again sold for only a fraction of its market value. Partition sales are also initiated by whites who have acquired part ownership in black owned land for the purpose of initiating partition and buying all the property. This is known as legal theft.

Foreclosures are most often fully legal and often the result of willful negligence by the landowner. However, there are exceptions, such as the case in which an elderly illiterate black man mortgaged his land for some groceries worth only a fraction of the value of the land.

These methods of black land seizure have been identified and are under scrutiny by various self-help groups. They have developed outreach programs of educational, legal, and financial assistance to black farmers. The education program is a preventive approach; it gives people basic information that they as landowners should know. Some organizations have included literacy programs as part of their agenda. Legal assistance focuses on will writing and legal land problems. Financial assistance includes financial counseling and development planning for farmers. Financial assistance in the form of loans is restricted by limited funds.

The extent and immediacy of financial difficulties among black farmers and landowners requires additional measures. One organization is in the process of developing a rotating cash fund in order to compete in auctions and drive up the bids. They hope that it will discourage the cheap acquisition of black owned land through partition and tax sales. Other organizations are looking at legislative means by which to remedy some of the problems. For example, mandatory administration of estates within a year of death would end the continued creation of heir property which is almost always lost through partition sales.[26]

Perri Butler, author of this article, examining hybrid sorghum rhizomes.

Land Ownership: A Challenge to Democracy

On July 4, 1852, Fredrick Douglas said:

> What to the American slave is your 4th of July?... You boast your love of liberty, your superior civilization and your pure Christianity, while the whole political power of the nation is solemnly pledged to support and perpetuate the enslavement of three million of your countrymen...You invite to your shores fugitives of oppression from abroad, honor them with banquets and greet them with orations, but the fugitives of your own land you advertise, hunt, arrest, shoot, and kill...In regard to the ten thousand wrongs of the American slave, you would enforce strictest silence.[27])

Slavery was a challenge to democracy, and the questions surrounding slavery demanded a response. Part of the response was a civil war. In 1987 we celebrated the bicentennial of the Constitution, a document which asserts the equality of all men and claims a form of government which seeks to derive its power from the consent of the governed. If people are unable to live in rural areas, although they wish to, and if power and wealth and the ownership of land is concentrated by large-scale agribusiness, then we have as serious a challenge to democracy as slavery was.

The general decline in farmers and rural residents reflects a weakness in the political and social health of our entire society. But the more specific eradication of black farmers and landowners poses serious threats to the welfare of the black community.

The land base of all ethnic groups in the U.S. is inextricably intertwined with their potential for social, political, and economic progress. The land itself is permanent and, if passed on from generation to generation, provides economic and social stability. Underrepresentation of blacks in land ownership translates into losses in terms of black earning potential. Politics in the South reflect the fact that black communities operate from a low resource base. They are in a poor position to achieve positive response from elected officials. Furthermore, land-owning blacks who possess a certain measure of independence tend to be more politically active than those who are landless.[28]

Blacks relocate in cities, hoping for educational and job opportunities. But neither hopes of educational enhancement, nor of better employment are usually realized for the newcomers. Blacks are overrepresented among the unemployed as well as among the underemployed. Blacks' ideas of social mobility, frequently associated with geographical mobility, prove to be an illusion. To be black in Tennessee is to be black in New York City.

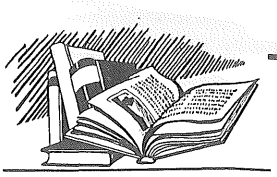
There are overcrowded cities, with violence, homelessness, and general poverty on the rise. There are empty farmhouses, and dying towns. Our agriculture is dominated by large farms and heavy machinery, and landowners who are predominantly white. But there are means by which the loss of black land can by slowed and hopefully halted, and we must embrace that hope or else they'll just continue "getting rid of all proof that we ever was. Like now they trying to get rid of all proof that black people ever farmed this land with plows and mules--like if they had nothing from the starten but motor machines."

> "How can a man beat a machine?" "No way? Hanh? That's what you say? Well, my brother did. With them two little mules, he beat that tractor to the derrick. Them two little mules did all they could, like my brother did. They knowed it was the end if they couldn't make it. They could hear the machine like everybody else could hear the machine and they knowed they had to pull,pull,pull if they wanted to keep going. My brother and mules, mules and my brother. So they pulled for him and pulled for him and pulled for him, sweating, slipping, falling, but pulling for him. Slobber running from their mouths, the bit cutting their lips, the slobber and blood mixing an falling to the ground, yet they did win. They won. But they wasn't supposed to win. How can flesh and blood and nigger win against white man and machine?"
>
> ---from **A Gathering of Old Men** by Ernest Gaines

REFERENCES AND NOTES

1. Robert S. Browne, 1973. **Only Six Million Acres: The Decline of Black-Owned Land in the Rural South** (Black Economic Research Center, New York, N.Y) p. 15.
2. "Blackbelt" refers to the dark soil of the region.
3. Peter Kolchin, 1972. **First Freedom: The Responses of Alabama's Blacks to Emancipation and Reconstruction** (Greenwood Press, Westport, Conn.) p. 16.
4. Leo McGee and Robert Boone, 1979. **The Black Rural Landowner: Endangered Species** (Greenwood Press, Westport, Conn.) p. 10.
5. McGee and Boone, pp. 11-12.
6. McGee and Boone, p. 18.
7. The Fifteenth Amendment, ratified on February 3, 1870, stated that the right to vote could not be denied citizens on account of "race, color, or previous condition of servitude."
8. W.E.B. DuBois, 1935. **Black Reconstruction** (Harcourt, Brace and Co., New York, N.Y.) p. 30.
9. Daniel Fusfeld, 1970. "The Basic Economics of the Urban and Racial Crisis" in **Review of Black Political Economy**, vol.2, No.1, p. 3.
10. Browne, p.27.
11. U.S. Dept. of Commerce, Bureau of the Census, and U.S. Dept. of Agriculture, Economic Research Service, **Farm Population of the United States, 1980**, Current Population Reports, Farm Population Series P-27, n. 54.
12. US Dept. of Commerce, Bureau of the Census and U.S. Dept. of Agriculture, Economic Research Service, **Farm Population of the United States 1985**, Current Population Reports, Farm Population Series P-27, n. 59.
13. **Farm Population of the U.S. 1980**, pp. 5,15.
14. U.S. Dept. of Commerce, Bureau of the Census, **1978 Census of Agriculture**, vol.1, pt.51, p.209.
15. **1978 Census of Agriculture.**
16. Ray Marshall and Allen Thompson, 1975. **Status and Prospects of Small Farmers in the South**, Center for Study of Human Resources (University of Texas, Austin, Texas), p.58.
17. Virgil L. Christian, Jr. and Adamantois Pepelasis, 1971. "Farm Size and the Displacement of Black Farm Families in Southern Agriculture," in **Human Resource Development in the Rural South** (University of Texas, Austin), p.19.
18. U.S. Department of Agriculture, 1981. **A Time to Choose: Summary Report on the Structure of Agriculture**, pp.121 and 123.
19. House of Rep. No. 95-986, p. 6. 95th Cong., 2nd session, reprinted in (1978) U.S. Code Cong. & Ad. News 1106, 1121,
20. U.S. Commission on Civil Rights, 1982. **The Decline of Black Farming in America**, p. 50.
21. U.S. Commission On Civil Rights, 1982. p.114
22. U.S. Commission On Civil Rights, 1982. p.133
23. U.S. Commission On Civil Rights, 1982. pp. 82-91.
24. **The Decline of Black Farming in America**, Table 4.1, "Number of Black FmHA Committee Members, 1979 and 1980", p. 93.
25. Browne, 1973., p. 52.
26. Examples of organizations are the Arkansas Land and Farm Development Corporation (Rt. 2, Box 291, Brinkley, Ark. 72021), and the Federation of Southern Cooperatives Land Assistance Fund (100 Edgewood Ave., N.E., Suite 1228, Atlanta, Georgia 30303).
27. Dubois, 1935. p. 15.
28. Browne, 1973. pp. 24-25.

Books



Joy of Man's Desiring

by Jean Giono
Translated by Katherine Allen Clarke.
North Point Press, San Francisco, 1980.

Reviewed by Roger Lebovitz

The breakdown of our modern agricultural system has many faces. There is the economic face of foreclosure. There are the widening faces of the gullies in the wheat fields and the corn fields. There are the empty faces of main streets in rural towns. All of these faces are features on a larger face, the face of culture. As has been said before on these pages, the problems of agriculture are problems of culture. The disintegration of farming and rural communities are the expressions of a profound cultural breakdown: the loss of the ability to produce food and, at the same time, create community. Creation, of course, is central to agriculture, but agriculture today seems to be characterized by destruction.

While the cultural connections of agriculture are occasionally recognized, they are often left unexpressed. Human emotions and expressions touch agriculture strongly, but are in need of an artfulness best achieved by the storyteller, not the scientist, for articulation. One such expression is joy. In his 1935 novel **Joy of Man's Desiring**, recently re-published by North Point Press, French writer Jean Giono touches firmly on the necessity of joy and happiness for a sustainable agriculture and culture, although he never employs these terms. The book tells about Bobi, the wandering acrobat and poet, who tries to bring an awareness of joy and beauty to the mundane existence of the inhabitants of Gremone Plateau. The isolation of their lives is transformed by his promotion of things apparently worthless and by his demonstration of the joy of fraternal compassion.

The intent of Giono's work is epic, and its execution is lyrical. While this marks the book an unlikely place of instruction for agricultural and cultural values, Giono nonetheless offers many lessons on the shape of the culture in which a sustainable agriculture might flourish.

The farmers of Gremone Plateau, a high table of land set between the Oueveze River and the mountains beyond, are held tightly by a grimness that forces on them drudgery and mindlessness and presses joy out of their lives like oil from a seed. Their crops are planted year after year without hope, and as they go about their daily and seasonal tasks, they are consumed only with the numbing certainty that they ought to be done. Into this world comes the wandering acrobat who, early one cold morning, draws the attention of Jourdan, a farmer plowing his field in the starlight, to the beauty of Orion.

> "What do you think of this night?"
> "I have never seen the like."
> "Nor have I," said the man. "Orion looks like Queen Anne's lace."
> "What did you say?" asked Jourdan.
> "Orion is twice as big as usual. There he is, up there. Stop. Up there. There. Do you see?"

Bobi seeks to instill new values into the lives of the plateau's inhabitants. He brings a stag from the valley below and allows it to run free through the woods, fields and farms of the plateau. The stag becomes a living embodiment of the joy to be gained by relinquishing possessions.

> "The world is wrong," said Bobi. "You think that it is what you keep that makes you rich. You've been told that. I tell you what you give makes you rich. What do I have? Look at me."
> He stood up. He exhibited himself. He had nothing but his shirt and under that his skin. He raised his long arms, waved his long empty hands. Nothing. Nothing but his arms and hands.

Inspired by the same spirit, the farmer Jourdan plants a field formerly in crops to narcissi flowers. In this act he takes Bobi's pronouncements to heart. The field of flowers draws the community of the plateau together, not because of any economically oriented self-interest, but rather as a membership given a new understanding of the natural world and their place within it. Whereas the harshness of the plateau once seemed to enforce the demands of a life of single dimensions, they come to realize its many places of joy and happiness.

In a distinct manner, Giono's work speaks to our agricultural situation. The cultural breakdown that forms the stuff of the current agricultural depression has an external aspect, the emptying of the rural countryside, and an internal aspect, a profound diminishment of joy and happiness in people's lives, such as portrayed in the lives of the inhabitants of Gremone Plateau.

Giono's novel suggests that joy and happiness are cultural necessities for sustainable farming. They are as necessary as healthy topsoil and clean water. They are a seedbed; without them hope is lost, and there is nothing to sustain.

April 10-30, Great Bend, Kansas
PERMACULTURE DESIGN COURSE in a rural setting with Dan Hemenway. Contact Sr. Betty Goebel, Heartland Center, 3600 Broadway, Great Bend, Kansas 67530. Call (316) 792-1232.

Sustainable Agriculture — into the Mainstream

Dana Jackson

When Dean Freudenberger (author, professor at the Claremont School of Theology, former agricultural missionary in Africa) visited last summer, he told us that there were sustainable agriculture courses or programs of some kind at seventeen land grant institutions now. We have seen information about some of them, and there seems to be a wide range of serious intent in the offerings. The University of Maine advertises eight core courses, with such titles as Soil Organic Matter & Fertility and Agricultural Pest Ecology. Three summer courses were offered in 1987 at Pennsylvania State University's Circleville Farm, "a student-faculty managed farm laboratory." The University of Minnesota now has an endowed chair in sustainable agriculture. The Wisconsin Rural Development Center points out that everyone from the university to industry is talking sustainable agriculture in Wisconsin because nearly two million dollars will be awarded for on-farm demonstrations in 1988. Kansas State University is offering a single introductory interterm course taught by the former head of the Agricultural Experiment Station.

Certainly these courses and programs are needed. There has been enough criticism of conventional agriculture and enough public discussion about sustainable agriculture to catch the attention of agricultural college deans. Some have adeptly adopted the jargon of sustainable agriculture, without much commitment to seeking funds and starting programs. Those who want to tack sustainable agriculture on to an existing research agenda that emphasizes biotechnology and chemical-based cropping systems are missing the point. Those who really support the shift of priorities within the agricultural college have to deal with the politics of budgeting and appropriations at the state legislature. They will find themselves up against the Farm Bureau/agribusiness lobby which will fight the transfer of funds from conventional programs to sustainable agriculture.

The movement for sustainable agriculture education and research did not begin within the state supported land grant universities. It began on the fringes, mostly in small alternative schools, in public interest organizations, or in weakly funded programs at some state universities, such as the University of California, Santa Cruz. Some of the alternative schools which led the way in sustainable agriculture are Meadowcreek in Fox, Arkansas; New Alchemy in New Falmouth, Massachusetts; Malachite Farm in Gardner, Colorado; and, of course, The Land Institute.

Most of the students who have become Land Institute interns were introduced to the idea of sustainable agriculture through liberal arts programs, not colleges of agriculture, in courses as diverse as geography, environmental studies, biology, religion, geology, and political science.

Several small colleges now offer interdisciplinary courses in sustainable agriculture. One is Evergreen State College in Olympia, Washington. Students can enroll in a year long, full time undergraduate program which combines natural sciences with a strong liberal arts core. Students in "Ecological Agriculture" integrate classroom learning with work on the college's organic farm and with extensive field trips throughout the Pacific Northwest.

Private, non-profit, public interest groups have been important in raising public consciousness about sustainable agriculture. The Kansas Rural Center, The Land Stewardship Project and the Nebraska Center for Rural Affairs have widened the discussion. Research organizations such as Worldwatch Institute and the Rocky Mountain Institute have provided data which support the arguments for sustainable agriculture.

With all of this in mind, there is still an important role for those on the fringe to play as the land grant schools begin to pull sustainable agriculture into the mainstream. The critique of industrial agriculture must continue, and the public discussion of ecological agricultural practices be increased. We must critically explore the meaning of sustainability and not allow jargon to replace substance in the courses and programs offered by our tax-supported institutions.

The term "sustainable agriculture" has entered common usage now, something not imagined when Wes Jackson used it in the first edition of **New Roots for Agriculture** in 1980. Saving soil was the main focus in that book, not saving dollars, as the contemporary usage of the term in the context of "low input" implies. Wes's concept evolved out of the goal for a "soft agricultural path," as a necessary complement to Amory Lovin's "soft energy path."

The Land Institute is a part of the whole movement for a sustainable agriculture. Yet our approach is very different, and our research program is unique. It is long-term, more risky, less easily understood. No other organization takes the concept of sustainability so far as to explore the fundamental change from annual monocultures to perennial polycultures. Although we agree that diversified grain/livestock farms are certainly more sustainable than specialized, factory-like operations, and we support research and education which will help all of us be better stewards of the land, we have a different agenda for research at The Land Institute. Even the best organic farmers still have soil erosion in their corn, wheat and milo fields. In the long run, we need agroecosystems more closely modeled after natural ecosystems. We seek a sun-powered system with built-in elements to prevent erosion and repel epidemics of insects and pathogens. This ideal requires an application of ecological principles to agriculture to a degree never before imagined. With this focus, we are still not in the mainstream.

Agriculture Intern Program

The agricultural intern program runs from mid-February to mid-December, the Growing Season Term. During spring and fall, mornings are spent in the classroom, and afternoons are used for physical work related to research, construction or maintenance. Research work dominates the summer session, but occasional field trips and seminars are scheduled.

The program is designed for college graduates or upper-level undergraduates. Interns receive stipends of $125/week for 43 weeks. They find their own housing in Salina, fix their own meals and bike or carpool to The Land for the nine to five day.

The Land admits students of any race, color, national or ethnic origin. For more information about the agricultural intern program, write The Land or phone (913) 823-5376.

Changing Your Address?

The Post Office does not forward 3rd class bulk mail. Please inform us if you change addresses. If **31** appears on your label, your subscription expires with this issue. PLEASE RENEW NOW.

THE LAND INSTITUTE
2440 E. WATER WELL ROAD
SALINA, KANSAS 67401

ADDRESS CORRECTION REQUESTED

NON PROFIT ORGANIZATION
U.S. POSTAGE PAID
PERMIT NO. 81
SALINA, KANSAS 67401

NAME_____

ADDRESS_____

_____

PHONE_____ DATE_____

CHECK CATEGORY OF CONTRIBUTION)
(Contributors receive **THE LAND REPORT**)

_____$15 _____$25 _____$50

_____$100 _____$500 _____Other

Subscription to **THE LAND REPORT**
_____$ 5 U.S. _____$10 Foreign

Friends of The Land

The Friends of The Land have been extremely important. They helped us keep going after a fire in 1976 by laboring to reconstruct our classroom building. Over the years they have donated materials, books, equipment and cash for general support. We need these Friends - and new Friends too- to continue our work.

The Land Institute is a private, education-research organization financed by personal contributions and grants from foundations. The broad-based support of individuals making annual contributions helps The Land in applying for financial support from foundations.

Won't you become a Friend of The Land by sending your donation? Contributors receive **THE LAND REPORT** and other occasional publications, plus notices of events sponsored by The Land Institute. The Land Institute is a non-profit organization, and gifts are tax deductible.