No. 3, Summer-Fall 1994

ZUNI FARMING
FOR TODAY & TOMORROW

An Occasional Newsletter of the Zuni Sustainable Agriculture Project and the Zuni Folk Varieties Project

Mapping Fields in Nutria

Fred Bowannie, Jr., Andrew Laahty, and Patterson (Pete) Peynetsa interviewed by Zuni Farming

Fred and Andy are Assistant Directors of the Zuni Sustainable Agriculture Project (ZSAP), which is part of the Zuni Conservation Project (ZCP), they are also Vice President and President of the Nutria Irrigation Unit of the Zuni Irrigation Association. Pete was formerly a representative for Nutria, and now works with Fred and Andy at ZSAP on the Nutria Pilot Project. The mapping of farm fields is part of the work that ZSAP is doing with the Nutria Irrigation Unit on the Nutria Pilot Project. Fred and Andy are using a Global Positioning System unit that plots the location of points on the earth by triangulating signals from satellites orbiting the earth. These data are then taken to the ZCP's Geographic Information Systems (GIS) Section where Stan Lalio and Quentin Lalio decode the data and use it to draw maps of the fields in Nutria.

These maps, along with maps showing soils, the canal system, streams and check dams, roads, and other features, will be available for farmers to look at and will be used for planning to increase and improve farming in Nutria. See the related story in Zuni Farming *No. 2, page 1. - Editors.*

Zuni Farming (ZF): Has mapping gotten easier since you first started in March of 1993?

see ***mapping****, page 2*

Who Will Control Zuni Seeds?

by Daniela Soleri, David A. Cleveland, Donald Eriacho, Fred Bowannie, Jr., and Andrew Laahty

In the last issue of this newsletter we discussed some of the problems Zunis are having in protecting their traditional culture and knowledge, including traditional crop varieties, or folk varieties (see ***Zuni Folk Varieties Survey and Seed Exchange Network***, page 19). We also printed a copy of the survey

see ***Zuni seeds****, page 6*

Zuni peach trees are one crop variety Zuni people are interested in protecting for future Zuni generations. Thelma Shishie talks about her childhood in her family's peach orchard at Pia Mesa, sitting next to the remains of a stone field house. For more on peach trees see Zuni Peach Orchards, Part III, page 25.

***mapping,** continued from page 2*

Andrew Laahty (AL): Yes. Like we said in the first interview, we were afraid to touch that GPS (Global Positioning System) unit, and now we have learned how to operate it. At first we were just trying to go plot by plot by plot and it was difficult. Well, why don't we add the Rio Nutria? That broke the barrier. We GPSed the Rio Nutria from the upper village down, and all those fields we'd mapped before just locked in, it was just like putting a puzzle together, like when you're almost finished with a puzzle and have 5-6 pieces left, it was just like that. Fred does his own sketch map of everywhere we log on the GPS. It was Fred's idea, and his maps really help when the GPS data is not clear.

On April 17th we had 15 parcels of family land we had mapped that had to be divided among family members. With the help of the maps that Pete had put together over the years using his memory, and his help in the field, we were out there for two weeks in the snow plotting out the property lines this spring. We then GPSed the boundaries, and compared them to Pete's map — they were almost exactly the same!

Inheriting Smaller Fields

ZF: What's the main reason that it turned out that there are three times or more the number of fields at Nutria you thought there would be when you first started mapping?

AL: Somewhere along the way one great big parcel of land was divided. As life goes on its divided again, reinherited. Zuni women used to play a bigger part in deciding who would inherit fields.

ZF: How will this turn out — everybody with a little tiny field?

Patterson (Pete) Peynetsa (PP): No, the way it works, it only goes to daughters, unless there are only sons. Men have to accumulate fields by buying them, they can't inherit them. Some of them still follow this tradition. Most men prefer to have land of their own, rather than just using that of their wife's family. A man has to write down whatever he bought the land with, Zuni clothing, or money, but must document the whole thing, so that following generations won't have trouble. Traditionally, in our grandparents' days, we went by verbal agreements and handshakes, those were binding. These days the verbal agreement is no longer binding.

ZF: If you only have a few acres of farm land, and four or five daughters, how do you divide the land? How do your children divide their shares among their children?

PP: They all have a right to equal shares.

Fred Bowannie, Jr. (FB): Sometimes people just give land to the older ones, or to the ones that are into farming or gardening. Or the kids could work the land together without dividing it.

ZF: Do problems then arise when land is given to only the ones interested in farming, and later on, after the parents have passed away, other children become interested?

PP: Yes this happens, but it's no problem if the ones farming will share. Sometimes you can't settle these disputes. They start calling each other names again and here comes the family feud.

Settling Land Disputes

ZF: One of the most important results of the mapping you've done so far is that its encouraged people to work out old disagreements about ownership. These disagreements, some of which go back a long time, have been a major problem keeping people from farming at Nutria. How did the mapping get people to resolve problems they hadn't dealt with in years?

AL: We are in the process of trying to help several families resolve disputes. At our last meeting I told the people, "If you don't settle your own disputes, you guys are going to fall behind."

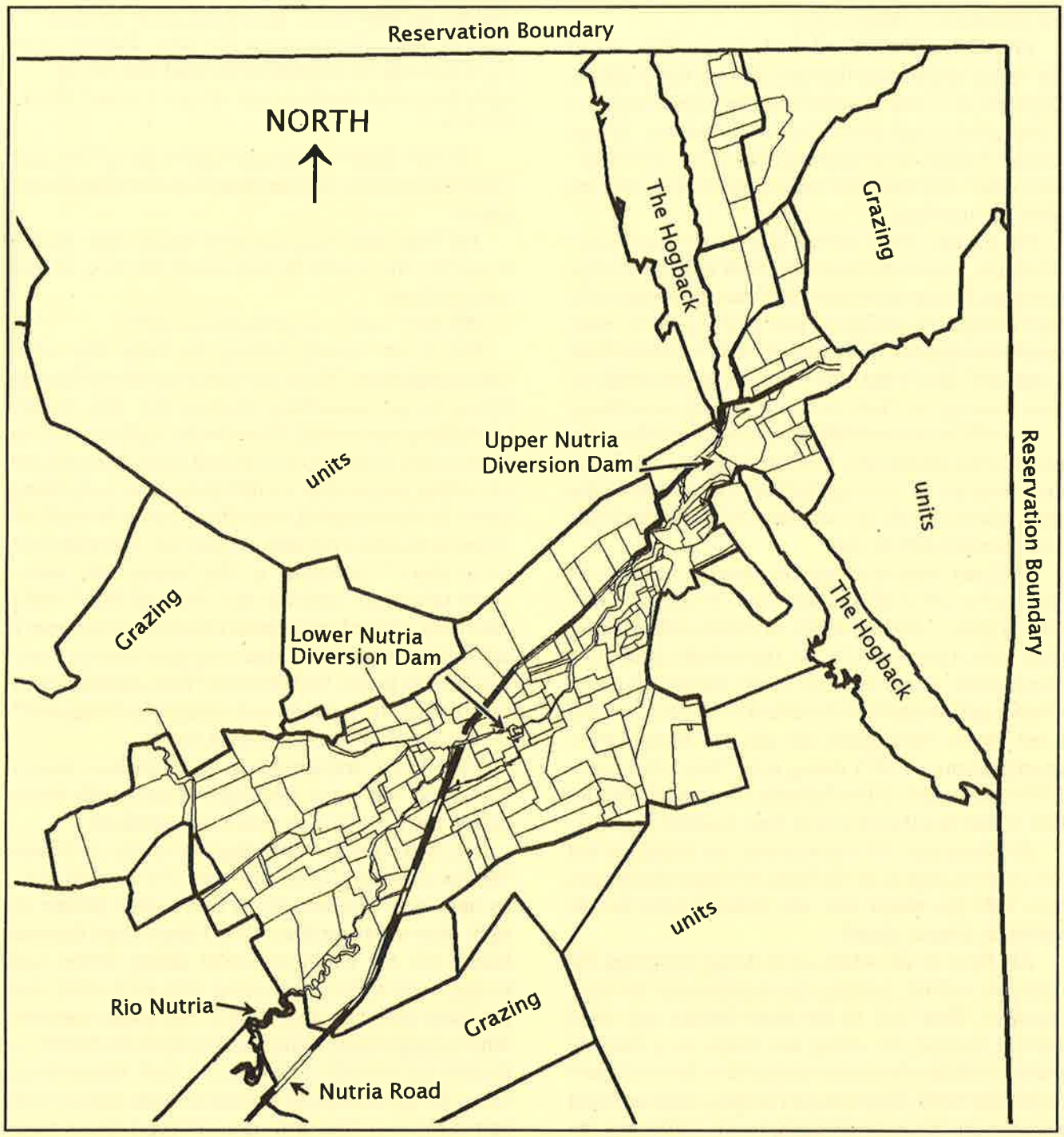
FB: One of the first places we worked was ***Dałaba:guna.*** There has been a lot of disagreement as to which people own which portion of land in there.

AL: The Tribal Council had already had a meeting over ***Dałaba:guna***, but nothing clear ever came out of it. No one seems to know what the Council decided.

FB: After we GPSed ***Dałaba:guna*** and Stan printed out a map, we asked the people involved to meet us out there. We gave them copies of the map, and they looked at it together. Some of them started to question the size of their fields. They said "We don't remember the land being that small." They also questioned their elders, and they said that some of the fields were a lot bigger than they are now, "Well, our land is not that small, the original boundaries are not where they are now, the original boundaries were bigger."

AL: We also showed them one of the old maps that Stan had, we made enlargements that we could give to the families.

FB: This mapping is a good way to get people out there to discuss their disagreements. Family mem-



Map of farm fields in the Nutria Irrigation Unit based on the Nutria Pilot Project's field work.

bers have come all the way from Oklahoma and California to help establish family claims! We asked them "Are these the original boundaries that you people know?"

AL: Nothing has actually been settled in ***Dalaba:guna*** yet and its going to cause us headaches in the future, but at least we got it recorded, mapped, so we can discuss it in the office without having to actually go back there every time. We sure miss the old people now, they actually knew the correct boundaries that people agreed on.

ZF: Because the US system, the Anglo system, emphasizes written documents, it allows Zuni people who want to cheat on verbal agreements an opportunity to do so. What is the main reason for the problems at Nutria? Because people remember ver-

bal agreements differently?

PP: Its the people that don't know anything about the verbal agreement that are causing the problem. Disputes are hard to settle the traditional way, but if you go through court that won't settle it either. You have to get the people together and let them face each other. But you have to document this in writing after the meeting.

FB: Its like when you're going out to put up a fence line, you say to yourself, "Well, nobody's using this area, I'll put up a fence line." But the minute you start doing something like that you've got too many people coming out there saying "Wait a minute! Wait a minute!" That's the only way we can get people to start coming out there is to start doing something.

We still have some elders who do know where the boundaries should be. If everything is settled and documented in writing before the parents pass away, then nobody can say you can't farm the fields your parents left to you.

AL: That's one of the problems we're having now that we've got it all mapped out, everybody says "that's mine." Its like a pile of candy with bubble gum in it, they want to get the bubble gum first. Somewhere along the way those families have to come together and talk to each other. Every meeting I tell them: "You guys are all one blood. Your grandparents weren't doing this." Yet, by the year 2000 they could still be fighting over parcels of land that could be all of theirs if they worked together.

ZF: Since the GPS surveys you are doing are not accurate enough to be the basis of a legal document, how will the maps you are making help people establish a legal claim?

AL: First of all, what we're doing is getting the disputes solved, getting the community to work together. That has to be done before any legal survey. Second, by using our maps as a starting point, it will be a lot easier and quicker for surveyors to do their work. If we can get funding, there are Zuni people who have the training to do surveying. We could hire them to do the surveys.

Unlocking Gates

AL: One problem we did solve at ***Dałaba:guna*** was access to the area. The few people in control put a lock on the access road gate and wouldn't give keys to others with rights to land up the road. We talked to the people with keys and told them "We need to get keys for the people who have property there but have no means of getting in there. Instead of complaining about people tearing up your fence, give them a key so they have access." They gave us the keys, and we gave keys not only to families with land, but to the hydrology and range people on the Conservation Project.

ZF: Why didn't the people who wanted keys and didn't have them, just go directly to the people with keys?

FB: They did try it, but they weren't successful. It was like those with the keys were claiming all that area in there.

ZF: Why were you guys successful?

FB: It was mostly talking to them like we're talking right now. When our fathers were working on trying to get something started like this mostly everything was verbal. There were really no written documents showing who owned what. But we keep on telling people that its different now, everything has to be documented, everything has to be verified. There is no way a person can just say "No you can't go in there." Its mostly in the family. "My sister won't talk to me, and she says this and this." And I ask them, "What is the main reason you guys aren't talking to each other?" and they don't know. They don't really know. We tell them "You should go and talk to each other and try and straighten things out."

ZF: Did they get angry with you?

FB & AL: No, it started to make them think. Here's somebody that's not even part of my family that's taking the time to care about our problem.

AL: When we have meetings we always tell them "Its not supposed to be this way. We were all born as one, were interrelated." I don't want people to fight over whatever they have. I don't want them to blame me for whatever we're doing. We're just trying to get them to get along with each other and get back into farming. That's our main concern. What's the problem? The family, inside the family — there's no outside problem, its just themselves. Often its the dominant person of each family who just takes over. She or he doesn't think about their siblings.

Keeping people informed

ZF: When the Nutria Irrigation Unit, and later the Nutria Pilot Project were getting started, some people were saying they didn't want to have anything to do with them.

FB: Not all of them, but some of them did. I think that what it comes down to is that they are really being misinformed. When you talk to one person he or she will have a good idea of what you're talking

about. Then he or she will talk to another person, and explain what we're trying to do, but that person may misinterpret it, and by the time it gets to the fifth or sixth person it will be a completely different thing, and spread out from there. To really get informed of what we're doing, and what we're trying to do, people should attend our meetings, then they will know what's going on and what's going to happen. To be part of what's happening and to make things better people should attend the meetings.

AL: That's why its so important for everyone at the meetings to fully understand what's happening, that's the most important part. That's where the empowerment comes in, to make the people understand. Once they understand I think it will be very easy to work with the people.

FB: I think we are getting people interested because we see a lot of people out there walking the fields. When we are doing our mapping it gives people the chance to come out and say where they think their boundaries actually are. It might start a little conflict, but you have to talk, not get off the track. We keep emphasizing that verbal agreements are no longer adequate

AL: It'll solve a lot of problems. I think that machine (GPS/GIS) is a problem solver.

Future Work

ZF: How much of the mapping have you completed so far?

AL, FB: So far we have mapped over 233 fields, totaling 2,993 acres.

ZF: What are the next steps with the field survey?

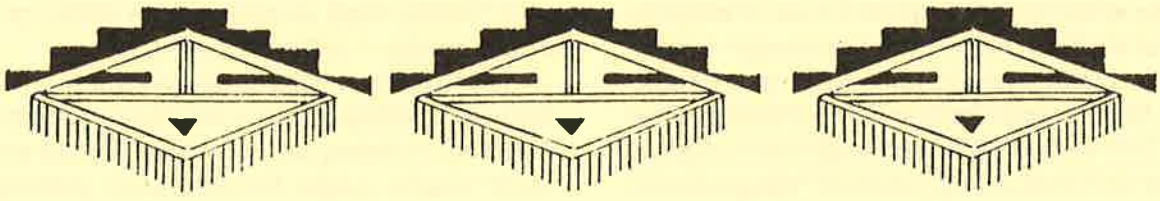
FB: We will eventually be able to give people a rough estimate of the acreages of their field. If it belongs to a whole family, we'll just record the field as belonging to the family, and they can agree on dividing up among themselves. After they do that we can go back and GPS those fields and put their name in there.

AL: After mapping fields owned by each family, we'll determine for each parcel of land what internal divisions have been made by family members. The GPSed map is just a locator map. In this way we'll try to eliminate future disputes by recording the agreed on divisions before people start arguing.

AL, FB, PP: Wilbur Haskie with the ZCP Conservation Section has been mapping grazing units for the Nutria Pilot Project. His work is almost finished, and together with our maps we will have a complete map of the Nutria area identifying farm fields and range units. One difficulty is that there are several areas in Nutria that are now classified as range units, but include historically known farm fields, for example Blind Canyon. The old fence posts are still there. Mapping these areas as agricultural fields could cause a lot of turmoil. Its been so long since they've been farmed that there will be a lot of disputes over ownership. People will start remembering, "Hey, that belonged to our grandmother." We won't put any names on this, the ownership has to come out from the family members themselves. People who have the grazing permit for that area won't like it either.

ZF: You have also begun interviewing people to get more detailed information on their farm fields, for example crops, yields, soils, and source of irrigation water source. How will this information be used?

FB: We'll use it for management. This information will eventually go into work on the irrigation system with pipeline and open ditch, also water control for rainfed fields. For proper planning we need to have information on the resources, as well as what people want, and then we need to experiment. In the past, most agricultural development at Zuni was done without adequate data, without people's opinions, and didn't produce very much that was useful for the Zuni people. Mapping Nutria fields, along with the interviews we've done, and the public meetings, provides important information for the plan that ZSAP and the Nutria Irrigation Unit are developing. Just as important, it gets people talking about problems and solutions, gets people involved. Through ZSAP, we'll be helping farmers in other Zuni farming areas, beginning with Tekapo and Pescado, to map their fields, canals and pipelines.



Zuni seeds, continued from page 1
we have been doing with Zuni community members to document their opinions.

In this survey we ask people's opinions about four situations (or scenarios). Each scenario is followed by three to four responses by farmers. The scenarios and the farmers whose responses follow the scenarios are not real, they are make-believe. However, even though they are make-believe, all of the scenarios describe things that have already happened or could easily happen at Zuni, and some have already happened in other Native American communities. For each scenario we asked people "Which farmer do you think had the best response?," "Why?," and "Is there another response not described above that you think is better? If so, what is it?"

These opinions form the basis of ideas for Tribal policies to protect Zuni seeds. We are working on these options now, and will make a summary available to the Zuni community later this year.

We surveyed members of the Zuni Tribal Council, the Zuni Cultural Resources Advisory Team, and the Nutria Irrigation Unit of the Zuni Irrigation Association. We told them that individual responses were confidential, but that the Folk Varieties Project would report a summary of all the answers in this newsletter and other publications. We appreciate their willingness to work with the Folk Varieties Project to help the community decide how it wants to protect Zuni folk varieties.

For all three groups interviewed, it was common to find an ideal position that Zuni folk varieties are only for Zuni people and should not be given, sold to, or used by outsiders. However, many people, including those who hold this position, believe that it is either too late or unrealistic to enforce this ideal, and that therefore Zuni folk varieties could be given or sold to, or used by outsiders, within limits.

Tribal Council and Nutria Irrigation Unit Responses

The **first scenario** in the survey is a seed collector coming to Zuni to find new corn varieties for his California company to sell (See *Zuni Farming* No. 2 for a copy of the survey. Copies of *Zuni Farming* No. 2 are still available at the Zuni Sustainable Agriculture Project Office, in the Zuni Conservation Project Office). Many respondents in both groups pointed out the Zuni belief that "the crops grown are the gift or blessing of the Creator," and that "things should be kept in the Zuni tradition" and not taken away from Zuni (farmer Will's response). Even so, the majority of people in each group selected farmer Evan's response, that a contract should be made between the seed company and the Tribal Council or "some other representative body" that would ensure that Zuni people would control the use of their seeds and share in any profits made with those seeds.

The **second scenario** is also about a commercial seed collector, but this time he is collecting seeds of Zuni corn so that his company can cross them with non-Zuni varieties to create new varieties to sell. Many Nutria Irrigation Unit members supported the view of farmer Jerry that Zuni seeds should not be given to outsiders, as one wrote "our seeds are our children, I do not believe in selling any seeds to Zunis or non-Zunis." But respondents from both groups also selected answers that included contracts between individual farmers and the company (farmer Dan), and contracts between the Tribe or some other representative body, and the company (farmer Mary). In addition, Tribal Council members were especially concerned that the Council be involved, at the same time that they recognized individual farmers' efforts: "The contract should be between the individual and the company but the Tribal Council should help write the contract. It might not be fair for just one person to hold the contract. There should be a one time payment to the individual and then long-term profits coming to the Tribe."

The **third scenario** is about a group of four farmers who have been growing blue corn successfully, and now have more than enough to satisfy their family needs. Farmer April's idea of selling only cornmeal, and not seeds, to outsiders was favored by many Nutria Irrigation Unit and some Tribal Council members. On the other hand, respondents from both groups also selected the approach of selling to outsiders without any special provisions for control (farmer Alfred). A councilperson pointed out that "Not many young people would respond the way April did, but older men who are active in Zuni religion would recognize the difference between April's [selling seeds] and Alfred's [selling only cornmeal] responses". Another one said "Selling food to outsiders is different [than selling seeds] — selling food is OK."

The **fourth scenario** is about Zuni farmers who have been selling produce and food products from Zuni folk varieties, and what they should do when some nearby Anglo farmers start growing and selling Zuni crops in competition with them. Re-

sponses to this scenario suggest that the survey made it difficult to see the difference between the first farmer's (Carol) suggestion of getting a trademark on the name Zuni for farm products just for the use of the four of them, and the third farmer's (Victor) idea that they should get a trademark for use by all Zuni tribal members. Other respondents selected a less formal and less powerful approach outlined by farmer Neil: that they simply tell the Anglo farmers to stop growing Zuni crops and using the Zuni name in marketing those crops, but if the Anglo farmers did not stop, then the Zuni farmers would not do anything else.

Whose blue popcorn? Because a Certificate of Plant Variety Protection has been issued for this "Hopi blue popcorn" variety, rights of farmers, including Hopis, to save or sell the seed are limited.

Zuni Cultural Resources Advisory Team Responses

The Zuni Cultural Resources Advisory Team formulated the following response in a series of discussions on the survey with the Zuni Folk Varieties Project. The Advisory Team is a group of seven Zuni religious leaders, recognized by the Zuni community. The Team, through the Cultural Preservation Officer, Andrew Othole, who is their liaison, is active in developing recommendations for the care of Zuni resources in ways consistent with and supportive of Zuni cultural beliefs. We greatly appreciate Andrew's work with us to finalize the Teams' opinions.

The Advisory Team felt it was important to make it clear that their role is not to make policy, but rather to develop recommendations as a group that reflect Zuni cultural values concerning the resources being discussed. They feel that developing policies concerning these issues should be the responsibility of another community-based entity such as the Zuni Community Seedbank Board of Directors.

On the broad topic of rights to Zuni traditional crop seeds and the Zuni name for agricultural products the Advisory Team believes that:

Zuni seeds should not be sold or given to outsiders for profit, resale, breeding, or trademarking because of their significance to the Zuni people. This statement applies to all long-time food crop varieties of the Zuni people including corn, beans, squash, melons, gourds, chilies, and peaches.

They stated that these seeds should not be used as a commodity for profit, and pointed out an event in Zuni oral narrative and history where their corn disappeared, and this was followed by a warning that the next time the Zuni people would not have a second chance. In addition, the Team added that once you let something as important as these seeds go you don't know how they will be used, because once they are out of your control, there are no guarantees.

It is important to point out that the Advisory Team made it clear that while their statement reflects an ideal that they believe in, it will not always reflect the changing world that the Zuni people live in and what is actually occurring in the Zuni community. Therefore when answering the following questions they always emphasized the above position,

but then discussed ideas that they felt best supported this position but also responded in a realistic way to each of these scenarios, reflecting actual choices people must make.

The first scenario. Advisory Team members said that in this situation there should be an agreement but they felt that such an agreement should be between the company and a community-based group whose work focuses on this topic, such as the Zuni Community Seedbank and its Board of Directors.

The Advisory Team realizes that sales of Zuni crops probably has and will occur, and they see their role as providing recommendations to the Zuni Community Seedbank Board of Directors. The Board would have the responsibility of mediating the impact of these sales through policies to demand protection and compensation for the Zuni people. The Advisory Team feels it is extremely important that the Zuni Community Seedbank Board of Directors understand issues of cultural appropriateness concerning the use of these crops, and that the Zuni Community Seedbank maintain community support.

The second scenario. The Advisory Team does not support the idea or practice of "crossbreeding", that is mixing two varieties to make a new variety. They feel that this is inappropriate for Zuni farming and would result in a loss of the distinct varieties that are important to the Zuni people. They stated that they know the special qualities of Zuni corn are desirable, but this kind of crossing is only done for making money, and the Zuni people never get any of that money.

The Advisory Team believes that there should be recognition and compensation not only for breeding new crop varieties using Zuni crop varieties now and in the future, but also for what has happened in the past. They feel that this is a policy question that the Team would be willing to make recommendations on, but that is the responsibility of the Zuni Community Seedbank Board of Directors.

The third scenario. The Advisory Team pointed out that there is a need within the Zuni community for increased quantities of traditional Zuni farm products such as blue corn. How to make them more available, and whether or not they should be available to outsiders were considered policy issues that should be addressed by a group such as the Zuni Community Seedbank and its Board of Directors.

If sales were considered as one way of increasing the availability of these products, Team members felt it was important to know if farmers would be selling their corn and other goods themselves, that is directly to customers vs. to a retailer. If the farmers are not selling directly then it would be very easy for them to lose control of how their corn or other farm products would be sold or used.

The Advisory Team felt that making a decision about the availability of Zuni seeds and farm products to outsiders is difficult because different outsiders have very different histories and intentions. For example, the Team pointed out that there is a long history of sharing these goods with the other Pueblos, especially the Hopi. On the other hand, there are many examples of Anglos who have used Native American seeds, foods, or tribal names for their own profit. Perhaps this means that the policy would need to depend on who the outsiders are, how they intend to use the farm products, and if they actually use them in the way that they claim.

One suggestion that the Advisory Team had was that the Zuni Community Seedbank could act as a marketing board for Zuni farm products both within and outside the community. The Zuni Community Seedbank could purchase surplus corn or other Zuni farm products from farmers for a fair price, the corn could then be resold in the community with a minimal price increase. The Zuni Community Seedbank would not do this for profit but as a community service. The Advisory Team stated that they would be willing to provide recommendations to the Zuni Community Seedbank Board of Directors concerning these policies. By doing this, and actively seeking community input, the policies could best reflect Zuni concerns and interest.

The Advisory Team believed that such an arrangement could offer the following advantages: community members would have a source for Zuni farm products that they know are Zuni and of good quality, farmers would know they have a way to market their surpluses, and both those buying from and selling to the Zuni Community Seedbank would have the assurance that these transactions would be done in a way that was supportive of Zuni cultural and religious values. Options could be considered such as selling whole seed only within the community and fresh produce such as sweet corn or processed foods such as cornmeal or parched corn to non-Zunis to ensure that no viable seed would be sold to them.

The fourth scenario. This question focused the discussion on the issue of trademarking. The Advisory Team favors protection of the Zuni name for use by tribal members only. Protecting cultural

resources such as Zuni crops, foods and the Zuni name for use by tribal members was seen by the Team as a sovereignty issue that should be addressed. They felt that how this protection was achieved is a policy issue and the responsibility of an entity directly concerned with the topic such as the Zuni Community Seedbank Board of Directors.

Developing Policy Options

Zunis and other native peoples have become more and more involved in struggles over rights to resources, like water and land, that at one time were freely available to all. The same is happening with folk crop varieties.

Developing policy options for dealing with farmers' rights in folk varieties is a very complicated task. Zuni farmers, like most farmers, have traditionally shared seeds freely with each other and with their neighbors. The increasing private control and manipulation of seeds by companies for profit has changed this situation. Many indigenous or native peoples like the Zuni are becoming reluctant to freely share their folk varieties. Lack of formal policies concerning these issues does *not* mean that these communities are unaware or unconcerned about them. Indigenous groups must learn more about the issues and their options, so that they can at least decide whether they want to do anything or not. Otherwise, those with the most influence in the government, the courts, and the market place will dominate the scene for their own interests. These interests are not likely to be those of indigenous groups.

An important part of the Zuni Folk Varieties Project is exploring alternatives that can protect the rights of indigenous communities and their farmers in their folk varieties. During the rest of the Project we will continue to work with the Tribal Council, Cultural Resources Advisory Team, and other community members to develop agreement on how Zunis wish to protect their intellectual property rights in their folk varieties. We will consult with lawyers and other outside experts on specific ways in which Zunis can get this protection, for example protocols (rules) for outsiders collecting Zuni seeds, contracts with outsiders using Zuni seeds, and trademarking of the use of the Zuni name in selling Zuni seeds, produce, and food products. As the project draws to a close this summer we will compile all of the different ideas that have been gathered both within and outside the community in a report for use by the Zuni people. This work will be continued by the Zuni Community Seedbank Board and the Zuni Sustainable Agriculture Project with the goal of establishing Zuni Tribal policy to protect Zuni folk varieties.

Editors' note: The results of the survey have also just been published as a chapter, "Gifts from the Creator: Intellectual Property Rights and Folk Crop Varieties," in the book Intellectual Property Rights for Indigenous Peoples, A Sourcebook. *A copy of the book can be seen in the Zuni Sustainable Agriculture Project office. Documenting Zuni's opinions about control of their seed was also part of the Peach Orchard Survey,* *see article on page 25.*

Survey results

Scenario	*Nutria Irrigation Unit members*	*Zuni Tribal Council members*
#1	third farmer (Will) = 6 fourth farmer (Evan) = 8	third farmer (Will) = 2 fourth farmer (Evan) = 3
#2	first farmer (Dan) = 3 third farmer (Mary) = 2 fourth farmer (Jerry) = 6	first farmer (Dan) = 1 third farmer (Mary) = 3 fourth farmer (Jerry) = 1
#3	second farmer (Alfred) = 1.5* third farmer (Winston) = 2 fourth farmer (April) = 7.5*	second farmer (Alfred) = 3 fourth farmer (April) = 2
#4	first farmer (Carol) = 4 third farmer (Victor) = 4 fourth farmer (Neil) = 3	third farmer (Victor) = 5

*respondent gave two answers to this question, each one recorded as 0.5 votes

Nutria Irrigation Unit Update

by Fred Bowannie, Jr., Andrew Laahty, Andrew Lonjose, and Philbert Acque

Nutria Irrigation Unit Meeting on October 22, 1993

We gave our final report to a crowd of over 40 people. We informed them of what had been done in Nutria and on the Nutria Pilot Project from spring to fall of 1993. Everyone was very impressed with what had been accomplished, and the plans we have for the coming years for Nutria and the other farming communities. We explained that our objectives as officers for Nutria are to

- get the Nutria community more involved,
- complete our mapping of farm fields,
- complete a working plan for increasing and improving sustainable irrigated and rainfed farming at Nutria, and
- help the other Zuni farming communities by sharing what we have learned by working in Nutria.

We informed the people that we had fulfilled our two years as officers for the Nutria Irrigation Unit, and that new officers were to be elected tonight. At that moment Mr. Charles Hustito suggested that the members vote to retain us in office by acclamation, which was done.

The only change that was made was for the President and Vice President to switch offices. Andrew Laahty became President, and Fred Bowannie, Jr. Vice President, while the position of Secretary was retained by Andrew Lonjose, and of Treasurer by Philbert Acque.

Other topics on the agenda that night included obtaining an adequate inspection of the Nutria Upper Diversion Dam. A vote was taken with the results of 38 for an inspection and 0 against it.

We also voted on changing the dues for the Nutria Irrigation Unit. The result was 24 for, and 1 against, making the dues $12.50 per year for those with dryland (rainfed) fields, and keeping them at $25.00 per year for those with irrigated fields. We began collecting dues in the first month of 1994.

The Nutria Pilot Project

For the past year, the Nutria Irrigation Unit has been working closely with Zuni Sustainable Agriculture Project (ZSAP) as part of the Zuni Conservation Project, on the Nutria Pilot Project. The Pilot Project has been working closely with the other components of the Zuni Conservation Project, especially the Hydrology and Watershed, and the Geographic Information Systems sections.

Andrew Laahty and Fred Bowannie, Jr. taking a soil sample in a Nutria field. Photo by D. Prevost

Working with ZSAP has enabled us to update our agriculture field maps by identifying who the owner or the owners are for these fields. But the most important thing is talking to the people — and finding out what their views are, what they would like to see improved, what problems the farmers have in their fields (see "Mapping Fields in Nutria," page 1).

ZSAP and the Nutria Irrigation Unit have been interviewing farmers about past and present techniques of farming in the Nutria area, and what they see as their biggest problems and the best solutions to them. We've also started a second survey, on which we ask questions like What kind of crops are grown in this area? What methods of water management do farmers use? What kinds of erosion control

structures do farmers use in their fields? What methods of irrigation do farmers use in rainfed fields? How can we better manage the limited amount of water stored behind the Upper Diversion Dam, so that farmers, livestock, fish and wildlife will all benefit?

More and more people are interested in growing crops, and feed for their livestock, water is another major objective. The rehabilitation of the upper and lower diversion dams so that they can hold more water would produce great benefits for the Nutria people. Improvement of our existing irrigation canals will also enable more farmers to irrigate their fields.

Soil erosion is another major concern of farmers. We will be working with ZSAP, and the Conservation Project, to answer questions such as: What is the state of the watershed above Nutria? What effects has erosion there had on the farmers in the Nutria valley, as well as on other lands down into Zuni? How can farmers, livestock owners, the Fish and Wildlife Department and others in the Nutria area benefit from spring and summer runoff from the upper watershed? What roles will traditional techniques and modern techniques have in a water management plan to help combat erosion in agriculture fields and range lands?

Mapping Soils

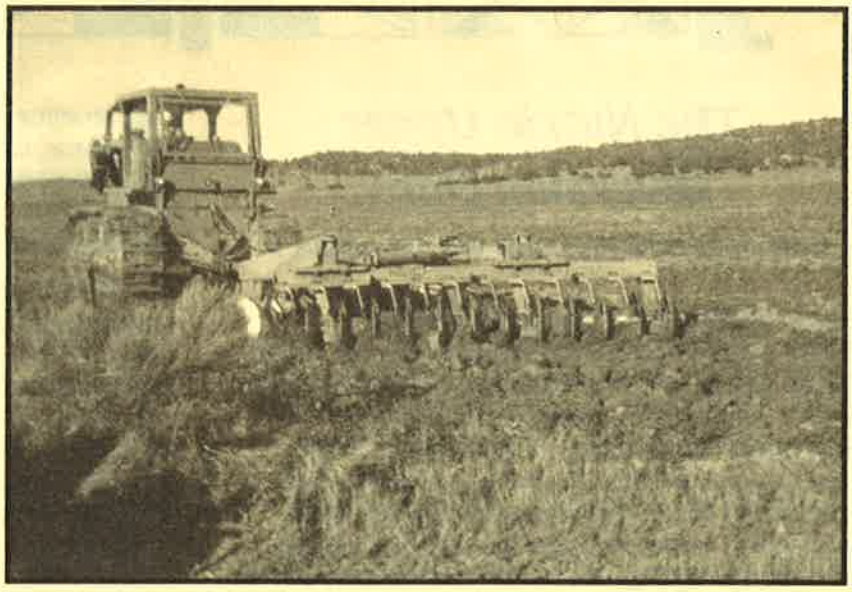
The farmers knowledge of soils on the Nutria area is important. We have been working with Deb Prevost of the Soil Conservation Service (SCS) to understand the soils in Nutria fields so that we can plan for improving farming (see articles in *Zuni Farming* No. 2, pages 6-9). We've started to have soils in the Nutria area tested, beginning with 26 samples taken from the most active fields last year. The results were good. Some areas in Nutria are heavy clay, other areas have salt layers, or sandy layers mixed with clay. With the data we have now and more information to be gathered, we will be working with SCS to put together a soil map of the Nutria farming unit. With all the information that has been gathered, we will have a better understanding as the basis for sustainable agriculture development in Nutria.

The Deep Plow Program at Nutria

by Fred Bowannie, Jr. and Andrew Laahty

Our involvement with the Bureau of Indian Affair's (BIA) deep plow program mostly started with our interviews for the Zuni Sustainable Agriculture Project, asking people their problems, their needs, and what they wanted. They don't have the equipment to go into their fields and plow it up, they've got sagebrush, and other weeds, and their ground is already compacted so that they can't plow it up. So we told them "If you want your field deep plowed we have applications for the deep plow program," and asked them how big the field is, and where it is. The only thing they have to provide is the fuel.

We increased the number of fields deep plowed in Nutria from 10 in 1991 and 3 in 1992 to 26 in 1993. The acreages deep plowed in those three years were 288, 24, and 223. We've been assisted by Gabriel Yuselew, Philbert Bowannie, Thomas Tsethlikai, and Lujan Ondelacy of the BIA Zuni Agency.



The deep plow machinery in Nutria. Photo by F. Bowannie, Jr.

The program also requires that they have to put their time into it after it is plowed to grow something — if they had livestock they could grow something like wheat or alfalfa. As Milo Owaleon suggested at one of our meetings, people don't have to plant the whole field, but can start with a small section, and expand later. But they should plow the whole field even if they don't plant, so the weeds won't come back again. In the long run we think it will benefit everybody, because we do have family and children that will be benefiting from it in the years to come.

We organized the deep plow program in Nutria by first seeing how they were doing it in Pescado. Pescado had problems with people paying for their fuel. So we decided that the best way would be for the Nutria Irrigation Unit to buy fuel in bulk, and we went to the Brentari Oil Company in Gallup. The Pescado Unit also bought their fuel there. At first we were using the GPS to find out how many acres were in each field, so that we could estimate the amount of fuel needed, but that didn't quite work out. Some of the fields were hard-packed by livestock and took more fuel. Gabriel Yuselew knew how much fuel it took to plow fields in different condition, because he had experience plowing similar fields in Pescado.

There was a significant decrease in the rate of fuel use when the deep plow crew changed machines. The D-9 dozer they were first using broke down and was replaced by a D-6. The D-6 used less fuel, and so we had enough fuel to finish plowing our fields.

While one field was being deep plowed, we would go to the next person in line and get them to give us money or furnish their own fuel. At a service station, 55 gallons would be about $120, but through the oil company we got it for about $45. In Pescado people had problems when they used their own barrels with water in them, so we rented barrels from the oil company so we knew they were clean.

Some people have asked if deep plowing makes the bind weed problem better or worse. Its hard to tell, because controlling bind weed is hard, no matter how may times you have it plowed. It will depend on how the farmer cultivates his or her field, but it can be controlled, it will depend on how much work they do. Another way you can try to control bind weed is to try to mow it down before it seeds, and gather it up so it doesn't spread.

Steve Smith said increasing alfalfa seeding rate can help to control bind weed. (Smith, of the University of Arizona, visited Zuni as a consultant for the Zuni Sustainable Agriculture Project last year, see article in *Zuni Farming* #2, pages 10-11). Andy also noticed this in his family's field in Pescado. The first year the alfalfa didn't get established, "all we saw was bind weed and other weeds. We baled everything though. This is our fourth year now, and most of the weeds are gone. Its mostly alfalfa growing their now, its killing the bind weed, suffocating it, it doesn't give it the chance to expand."

The Nutria Upper Diversion Dam

by David A. Cleveland and Fred Bowannie, Jr.

Lack of Water: A dam problem

"More water!" That's what people who are irrigating at Nutria, or who would like to irrigate there, see as their greatest need. In the first survey of the Nutria Pilot Project, 32 households listed their biggest farming problems at Nutria. Eighteen out of the 62 problems listed (20%) were inadequate water for irrigating, with two other households listing inadequate conveyance system and turnouts. The suggestions people had for solving their irrigation problems included installing pipeline, cleaning out the reservoirs behind the dams, establishing a rotation for irrigators, rehabilitating the upper watershed, raising the ditch levels, placing locks on the gates, and leveling fields.

Whether by increasing the supply of water, or increasing the efficiency of delivering and applying it to fields, the Nutria Upper Diversion Dam is a key for increasing sustainable irrigated farming at Nutria. Since most water flows through Nutria in the late winter and early spring, before the growing season, some storage is essential for irrigated crop production. Without adequate storage, and without knowing that the dam is structurally sound, it makes little sense to invest in major, expensive rehabilitation of the deteriorated irrigation system below the dam.

Present Status of the Dam and Reservoir

Since its construction, the Upper Nutria Diversion Dam reservoir has been badly silted up, and today stores very little water. A Soil Conservation Service (SCS) survey in January 1991 estimated its capacity at 70 AF (acre feet), with a surface area of 26 AF, for an average depth of less than 3 feet (1 AF = the water needed to cover 1 acre, 1 foot deep). In contrast, the stream flow in the Rio Nutria is averaging over 5000 AF/year, with flows concentrated in February-April.

Pete Peynetsa inspects the deteriorating condition of the east wall of the spillway, Upper Nutria Diversion Dam. Photo by F. Bowannie, Jr.

Stream flow data is available from the USGS streamflow gauging station on the Rio Nutria, at the mouth of the Nutria Canyon just above the Diversion Reservoir, from October 1969 to the present. This station monitors runoff from an area of 71.4 square miles in the Zuni Mountains. For the 23 complete years of recording the average yearly discharge was 5,169 AF. These data show that flows vary considerably from year to year, e.g. the lowest year was 1976 with only 97 AF and the highest year was 1980 with 16,217 AF.

There is also a lot of variation in the Rio Nutria from month to month. The highest flows occur in late winter and early spring as a result of snow melt in the upper watershed. By far the highest average monthly flows occur in March (1,906 AF) and April (2381 AF). The next highest flows occur on either side of these months in February (249 AF) and May (240 AF). Average flows for the other months are much lower, ranging between June (21 AF) and August (78 AF).

Nutria Spring above the Nutria Diversion Dam Reservoir yields about 50 gpm, equivalent to 6.3 AF/month, or 79.5 AF/year. Other recent measurements made by the Zuni Conservation Project and the Nutria Irrigation Unit were 60 and 65 gpm. In other words, in one year the spring alone could fill the reservoir's 75 AF volume, and it is especially important in the hot, dry spring months, and also in the summer rainy season, since summer rainfall produces little runoff in the Rio Nutria.

We need to investigate possible alternatives for increasing reservoir storage including dredging the reservoir, and increasing the height of the spillway and dam. At the same time, we need to explore how early spring irrigation before planting, when the runoff is flowing by a full reservoir, could store water in the clayey soils of the Nutria Irrigation District. This could benefit crops by reducing demand on water in the reservoir later in the season, when there is very little water flowing into the reservoir.

Together with the silted-in condition of the reservoir, the possible structural inadequacies of this dam are major obstacles to planning for rehabilitating the Nutria irrigation system. This has become a point of contention and frustration at Zuni, especially for Nutria farmers. It appears that before detailed planning by the Nutria Irrigation Unit and Zuni Sustainable Agriculture Project can proceed, a report is needed on the structural integrity of the dam, and on the feasibility of various options for rehabilitation. These options include relocation of the headgate, increasing the level of the reservoir, dredging the reservoir, and extending the reservoir. For example, the SCS won't help with irrigation rehabilitation until they have adequate proof that the dam is sound. Since the dam was built and maintained by the Bureau of Indian Affairs (BIA), it seemed that a logical and easy solution was to request the BIA to carry out an adequate inspection. But this didn't work.

Our frustration led us to investigate the history and current status of the dam so that we could better prepare a case for getting financial and technical aid for an adequate dam inspection.

Early Canal Irrigation at Nutria

By at least 1882, Zunis had built a 2.5 mile canal at Nutria fed from a reservoir created by an earthen dam on the Rio Nutria about 0.25 miles below the springs, with 300-5000 acres of farm land being irrigated, as shown on General Land Office maps. Cushing's description of 1884 mentions that the water was carried in "viaducts made of enormous hollow logs" to "straight ditches two miles in length" and then to 10 x 12 foot basins that look "like waffle-irons and regular as a checker board." Cushing estimated that 40 families raised wheat there, each cultivating from 15-20 basins to "several times" that many. Cushing says that because of a limited water supply, each family kept an "account-stick" into which they cut a notch which was liable to inspection by the "sub-chiefs." The wheat was harvested with knives, cutting it off near the head, then transported to earthen threshing floors where donkeys and horses threshed it.

Today, farmers interviewed by T.J. Ferguson recall that the Rio Nutria channel was shallow enough that water could be diverted from it into irrigation ditches with small dams, which would often wash out during flooding. As the Rio Nutria channel was eroded deeper by increased runoff, probably due to damage to the upper watershed caused by clear cutting timber and overgrazing by non-Zunis, farmers built a larger dam using horse drawn scrapers in 1922. This dam was located at the gap in the hogback where the present Upper Diversion Dam is. According to a Bureau of Reclamation report in 1969, this dam was later abandoned due to erosion of the stream channel and deterioration of the dam's earth fill.

Spring floodwaters pass by the Nutria Irrigation District through the Upper Diversion Dam spillway. Note erosion in the fields on the left bank. Photo by D. Cleveland

The History of the Nutria Upper Diversion Dam

With development of the Zuni Irrigation Unit below Black Rock Dam in the first decades of the 20th century, there was not much construction in the Nutria Irrigation District or other Zuni farming districts. In fact, the Government's plan was to have all Zuni farming concentrated in the Zuni Irrigation District below Black Rock, so that other Zuni farm lands could be taken over by non-Zunis. The Zunis defeated these attempts, however, and there were thriving farm communities in Nutria and the other outlying Zuni farm districts from the 1860s until the 1930s.

In the 1930s, because Black Rock reservoir had major problems of silt deposition since its construction, the BIA built several dams to reduce the sediment carried into the reservoir. During this period dams were built on the Rio Nutria, including an earthfill Nutria Upper Diversion Dam in 1932. At the same time the spillway tunnels were excavated on the left side by tunneling through the bedrock of the Hogback. Water going through the spillway downcut the river channel below even further, eating into fields on both banks, and this process is still going on today. That same year (1932) the dam suffered extensive damage from floods and so its height was raised sometime after 1943 to the crest elevation of 28 feet that existed in 1968.

In October 1933, "licensed Indian trader" R. Creasy Master wrote a report on Zuni dams based on what he claimed was 31 years' experience in building dirt dams and erosion control structures in the Zuni area. He concluded that the dry soil, "badly packed in places," especially at the abutments, was a major cause of the Nutria Upper Diversion Dam failure in the summer of 1933 after heavy rain.

A BIA photograph from September 1952 shows newly installed riprap on the upstream side of the

dam. Patterson Peynetsa remembers that during that same fall a dragline was hauled to Nutria in sections and used to clean silt out of the reservoir.

> You know how the kids are, we had some fun. We went after the fish left in puddles after the silt had been taken out, we put them in buckets and then threw them back in so we could catch them again! They put the silt on the West side, in an area where there was a little gully. The silt latter washed out when the dam broke in the 60s and 70s.

Andrew Peynetsa questioned the soundness of the Upper Diversion Dam in 1960, and he asked for assistance in getting a full inspection of the dam. In that same year, Vernon J. Larsen, the BIA Area General Engineer, visited Nutria in relation to the operation and repair of the emergency spillway, on the right side of the dam. He noted that "some small holes washed under the emergency spillway spreader wall" on the west side of the reservoir so that water flowed out this way rather than through the spillway tunnels on the left side. About one-quarter mile below the dam the water emptied back in the Rio Nutria main channel and started head cutting backwards. This head cutting had been going on for about 6 years in 1960, and in that year cut about 14 feet deep and 200-300 feet long, ripping out the 3 inch pipe that carried domestic water to Lower Nutria Village. Larsen recommended a dike starting at the emergency spillway and continuing down the valley to spread water on pastures.

According to Zuni farmers interviewed by T.J. Ferguson, the reservoir filled to capacity in 1965-66 and a 30 foot deep channel was again cut on the right side of the dam. To make emergency repairs the top 2 feet of soil was removed from the field below the dam. As a result, the farmer who used to cultivate that field claimed it had been left only with soil in which nothing can grow. He also said that rebuilding of the ditch left the field unable to be irrigated.

The Upper Diversion Dam was inspected by the Bureau of Reclamation in December 1968 and a Safety of Dams report by Rosillion and Lewandowski was issued in January 1969. In it they concluded that the dam appeared to be

> performing satisfactorily.... However, the safety of the structure under flood conditions cannot be predicted with any certainty until it can be determined how the structure will withstand an inflow design flood prepared by using present-day hydrological techniques.

Documents show that in March of 1971 elevations and cross sections were established f the Dam to provide data for a preliminary desig and cost estimate for enlarging it. It is not clear what happened to these, because in 1973 Governor Robert Lewis asked the BIA Albuquerque Area Office Director to have an evaluation done on the feasibility of increasing storage, either at the present dam site or in Nutria Box Canyon. Again, it appears as though this study was done, but we have not yet been able to locate it throug the BIA. This was after the right end of the dam again washed out in that year, removing a sectio of the road and damaging the structures at Nutria Numbers 2 and 3.

The dam washed out again in spring of 1974, and was repaired in the fall of that year for temporary use. In June 1974 the Bureau of Reclamation released the "Zuni Safety of Dams Project" report, which we have not yet been able to locate either through the BIA or the Bureau of Reclamation. The Civil Engineer (probably from the BIA Albuquerque Area Office) recommended (probably in 1974) that foundation investigations be undertaken to plan for a structure that could detain a maximum probable three-day inflow and projected silt deposits for 50 years, for flood protection. The Engineer also suggested the possibility of off-stream storage (i.e. a reservoir away from the main stream channel) for irrigation or recreation.

The dam washed out again in the spring of 1975, and in March of 1975 the Bureau of Reclamation issued yet another report, which we also have not yet been able to locate. In May 1975 the Acting Governor of Zuni (Dorson Zunie) requested the BIA Albuquerque Area Office to rebuild the Diversion Dam based on the Bureau of Reclamation recommendations of 1975. He also asked the BIA to consider a dam in the Upper Nutria Canyon, off-stream storage below the Diversion Dam, and drilling a well for supplying groundwater for irrigation.

Trying to Get an Adequate Dam Inspection

In the late 1980s, a group of Nutria farmers, led by Patterson Peynetsa and Scotty Kaskalla, requested assistance from the SCS in improving the Nutria Irrigation District. The SCS, however, was unable to help in implementing improvements without knowing the condition of the Upper Diversion Dam. In a

letter of July 1991 the SCS Gallup Field Office requested the BIA Zuni Agency to provide an inspection report on the Upper Nutria Diversion Dam.

The letter stated:

> There is an immediate need to study the Upper Nutria Dam to determine if it meets federal and state standards for safety and to determine the feasibility of enlarging the storage capacity of the reservoir. It would be helpful to the planning process if BIA could furnish SCS with this information.

The BIA Zuni Agency did not supply this information, but beginning in the spring of 1992, the BIA Zuni Agency offered the newly formed Nutria Irrigation Unit of the Zuni Irrigation Association a plastic pipeline to replace the upper portion of the main irrigation ditch. The Irrigation Unit officers told the BIA that they had to refuse this offer until an adequate inspection of the dam was carried out, and they began requesting the BIA Zuni Agency for a dam inspection. In addition, the BIA was not able to provide plans or explanations for their proposed design that were satisfactory to the Unit officers.

Fred Bowannie, as President of the Nutria Irrigation Unit, observed in his inspection of the dam in 1993, that the main irrigation headgate is old and difficult to operate, and held in place with mortar in which there are cracks up to 3/4 inch wide. At the spillway on the left side of the dam there is leakage around the gate and erosion of the dam, with water seeping out of the spillway tunnel, and pieces of the tunnel walls are falling in. Seepage is greatest on the right side of the dam, that has been washed out and repaired many times, and the ground below the dam is soft and wet. There are signs of sinking on the top of the dam and rodent infestation on the upslope and downslope sides over the length of the dam.

In May 1993 the BIA responded to the requests for a dam inspection by referring the Nutria Irrigation Unit and the Zuni Sustainable Agriculture Project to a short report of a brief visual inspection by Augie Mueller, the Tribal Safety of Dams engineer, which the Agency had apparently requested. Later, another brief report was submitted to the Tribe by Mueller. These reports were not to the satisfaction of the farmers because Mueller's conclusion that the dam would survive a 100-year flood was based only on a visual inspection of the dam.

The result is that we still do not have the proper inspection reports needed to evaluate the feasibility of increasing reservoir storage, or to know that if a new irrigation system is installed below the dam, it won't be destroyed when the dam fails due to structural problems.

We are still in the process of determining what an adequate dam inspection report must contain to satisfy SCS requirements for beginning to provide assistance in implementing irrigation improvements at Nutria. We also need to determine how an inspection will be paid for. Because there is no permanent habitation or major capital investment in the probable dam failure flood area, the Nutria Diversion Dam was not classified as medium or high hazard by the Bureau of Reclamation Safety of Dams (SOD) Denver office in their recent classification of Zuni dams. Therefore, the BIA SOD program, which is paying for inspection of BIA dams at Zuni classified as medium or high hazard, will not pay for inspection of the Nutria Upper Diversion Dam. We talked with the SOD people in the Bureau of Reclamation Denver office, and they said that they could do an inspection, but only if they were paid for it. If the BIA does in the future agree to pay for an inspection, funds would probably have to come out of the irrigation rehabilitation program, not the BIA SOD.

In response to a copy of an internal Zuni Sustainable Agriculture Project memo we sent to the SCS in October 1993, SCS responded that they could not carry out an inspection as part of the free technical assistance they offer in agricultural development planning because the dam was the responsibility of the BIA. SCS did provide us with copies of SCS dam inspections of other dams in New Mexico that had been done in the past. The SCS has no formal guidelines for what an inspection should contain in order to satisfy their requirements for construction assistance. However, the SCS considers the Nutria Upper Diversion Dam to be a "moderate to high hazard structure," and reconfirmed that their national policy requires "a comprehensive engineering report to be prepared by a non-SCS registered professional engineer who is experienced in the design and construction of dams." It is the opinion of the SCS State Geologist that the complex geology of the present dam site not only means that a thorough evaluation of the site is essential before any construction to provide additional storage, but providing storage at this site would probably be very expensive .

We loaned the SCS dam inspection documents to the BIA Zuni Agency so that they could determine how they could help. The Nutria Irrigation Unit had started to work with Henry Yawakie, who had been

newly appointed to work on irrigation at the BIA Zuni agency, but he was soon transferred to the roads department. The BIA Zuni Agency later told us that they could not help in obtaining money for or in carrying out an inspection.

The Final Report of the Nutria Irrigation Unit stated in November 1993:

> The Nutria Irrigation Unit would like a full inspection of the Upper Nutria Diversion Dam. We do not want to invest monies in future projects without an inspection....The government agencies we have contacted concerning the feasibility of starting an irrigation pipeline ask the same question: Has our dam been fully inspected? We have to say no, not to our satisfaction. Without this inspection it is not likely we will be able to seek help in planning an irrigation pipeline or any other related projects.

On March 30th of this year the Zuni Conservation and Sustainable Agriculture Projects staffs met with personnel from the Tribal water rights program, SCS Gallup Field Office, and the BIA Zuni Agency, to again discuss the need for an inspection of the Nutria Upper Diversion Dam. The water rights people learned what was happening in the Nutria Pilot Project, and also toured the Nutria Irrigation District, especially the dam. The possibility of cooperating with the water rights program to get a dam inspection by the Bureau of Reclamation paid for was explored. This is justified, since the dam is vital not only to Nutria farmers, but for water use planning by the whole Zuni community. In April Governor Lewis sent a formal request to the Bureau of Reclamation for an inspection of the Nutria Upper Diversion Dam.

This summer the Nutria Irrigation Unit emptied out Nutria Upper Diversion Dam Reservoir by encouraging farmers to irrigate, and held work parties to clean out silt behind the head gate. The headgate was repaired on July 24th. Fred Bowannie, Jr. and Andrew Laahty documented the condition of the dam, reservoir, headgate and spillway on video, as evidence that can be used in still more requests for an adequate dam inspection. As of August there is still no money available for an inspection of the Nutria Upper Diversion Dam.

Our sources. In addition to interviews with Zuni community members, government agencies employees and others, and documents from office files, we used a number of reports and other publications in preparing this article. The most useful ones are listed below. Copies of file documents and all the documents listed below, except for Cushing and Ferguson, are at the Zuni Sustainable Agriculture Office, cared for by Fred Bowannie, Jr. The Cushing and Ferguson documents are available at the Zuni Archeology Program library. We thank Chris Banet of the BIA Albuquerque Area Office, Dan Bloedel of the SCS Gallup Field Office, and Mark McKinley of the SCS Area North Office, Rio Rancho, for help in obtaining documents.

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Is There a Market for Zuni Crops?

by David Cleveland and Daniela Soleri

Zuni farmers sold large quantities of farm produce during the early period of United States influence, and the US government since then has encouraged commercialization of Zuni farming. Today, however, almost all of the crops grown at Zuni appear to be used at Zuni without being sold, except for some baled hay sold locally. Of the 32 households interviewed so far in the Nutria Pilot Project Survey #1, 31 said that they did not sell any crops grown at Nutria. The one exception said they sold some corn.

A number of Zuni farmers and gardeners have shown interest in the possibility of marketing some of their crops. Their customers could include other members of the Zuni community. Many people believe there is a great interest in the Zuni community in being able to purchase both traditional Zuni farm produce such as blue corn, beans, and squash, as well as fresh produce such as cilantro, tomatoes, onions, and melons. Certainly, meeting community needs for special Zuni foods and other good quality farm produce would be the most valuable contribution marketing could make. However, the visitors who pass through Zuni could be another source of customers for Zuni farmers and gardeners.

What opportunities are there for Zuni farmers and gardeners to sell produce to these visitors? To start investigating this possibility Zuni Folk Varieties Project has had short survey forms for visitors in the Pueblo of Zuni Arts and Crafts Center and Running Bear store last summer and fall (see article and copy of the form in *Zuni Farming* No. 2, page 18). We thank Jim Ostler and the staff of the Zuni Arts and Crafts Center, and Kitt South and the staff of Running Bear for their help.

The overwhelming response of the 153 completed surveys is positive about buying Zuni produce, especially if it is organic, and especially if the crops are Zuni folk varieties (see Table). Foods made from traditional Native American crops are increasing in popularity, for example blue corn chips. Some Native Americans are marketing their own products, for example Santa Anna Pueblo's "Tamaya Blue Parched Corn." The package of the Alamo Navajo's "Sky Blue Roasted Blue Corn Meal" says that it is "organically grown" and "gathered in spiritual baskets."

Organic produce, grown without manufactured commercial fertilizers, herbicides, or pesticides, is increasingly popular, and often demands a higher price than produce grown using those chemicals. For example, Robert Mora of Tesuque Pueblo's Natural Farms told us that he has had great success in marketing organic produce at the Sante Fe Farmers' Market. The New Mexico Organic Agriculture Commission certifies New Mexico growers so that they can use the term "organic," but charges $100 a year, far too much for many farmers and gardeners to afford. Its also possible to simply advertise as "grown without commercial fertilizers or pesticides," without getting official certification.

The survey is not of a representative sample, but gives Zuni farmers and gardeners who are interested in marketing an idea of what the potential might be for sales to visitors. Ultimately, whether Zuni farm products, especially culturally important folk crop varieties such as blue and white corn, should be sold, and if so how, is a decision that the Zuni community will have to make (see "Who will Control Zuni Seeds?", on page 1).

Market survey Results

	Question	Answer	No.	%
1.	As a visitor to Zuni, would you be interested in buying Zuni-grown fresh produce (cilantro, chilis, tomatoes, squash, melons, peaches)?	Yes	144	94%
		No	7	5%
		Maybe	1	1%
2.	As a visitor to Zuni, would you be interested in buying Zuni-grown packaged farm products such as whole blue or white corn, cornmeal, dried beans, or dried peaches?	Yes	140	92%
		No	7	5%
3.	If the products were grown from traditional Zuni crop varieties (as compared with a standard commercial varieties) would you be:	More interested	143	93%
		Less interested	3	2%
		No difference	6	4%
4.	If the products were organically grown (without herbicides, pesticides, or commercial fertilizers) would you be:	More interested	136	89%
		Less interested	3	2%
		No difference	13	8%
5.	If they were available would you consider buying traditional Zuni foods made from Zuni-grown farm products?	Yes	145	95%
		No	6	4%
		Maybe	1	1%

The Zuni Folk Varieties Survey and Seed Exchange Network

by Donald Eriacho, Daniela Soleri, and David Cleveland

An important way in which the Zuni Folk Varieties Project (ZFVP) will encourage more farmers to plant Zuni folk varieties will be through the Community Seed Exchange Network, which is growing out of and expanding the original Zuni Community Seedbank.

The Zuni Community Seedbank (ZCS) was originally established by the Traditional Crops Project of the Zuni Archeology Program as described in the article by Carol Brandt in *Zuni Farming* No. 2, page 22. The seedbank is now being cared for by the Folk Varieties Project, and is located at the Zuni Conservation Project Office. The purpose for the collection of seeds in the ZCS freezer is to keep some seed as a back-up for crops being grown by only a few people, or by no one at all in the community.

Our main effort to increase the number of farmers growing Zuni crops is by creating a network of cooperating Zuni farmers and gardeners who are growing Zuni crops and are willing to share some of the seed with other Zuni farmers or gardeners. Those seeking specific kinds of Zuni seed can either get in touch with any network member who has the seed, or if they prefer, ZFVP can make the contact.

On the Folk Varieties Survey which Donald is doing (which builds on Carol and Jerome's 1991 survey), we ask about what kinds of Zuni seeds people have, and if they would be willing to share them through the Community Seed Exchange Network. A copy of the survey is on the next two pages. (We thank Willie Eriacho and Alex Seotewa for helping us with the Zuni names for crop varieties used in the survey.) The survey also asks about the original source of folk variety seeds, and tries to get opinions of more Zunis about outsiders having and using Zuni seeds (see "Who will Control Zuni Seeds?", page 1).

Most of those interviewed by Donald so far who have Zuni seeds are very interested in being in the network. Donald has a list of people who are willing to share seeds of each Zuni variety, and will provide this, to Zuni people who would like some seeds.

Also, if anyone has seeds they would like to share, please see Donald.

Only small quantities of starter seed will be available through the network, and those who receive the seed will be asked to pay the network back by returning a specific amount of the seed they harvest to it. The details and guidelines for how this network will operate will be decided by the ZCS Board of Directors.

Zuni blue corn plant, part of the Zuni Folk Varieties Project study on the health of Zuni folk varieties. Photo by D. Cleveland

ZUNI FOLK VARIETIES PROJECT, FVs SURVEY, 1993-94

Name of person(s) interviewed_____Est. age____ Telephone #_____ P.O. Box #_____
Household #_____ Date:_____ 1993 Interviewer:_____ ***Is confidentiality form signed?***_____

1. Do you think that non-Zunis should have traditional Zuni seeds (i.e. white people who may want them for commercial reasons)?___ Why?_____
2. Do you think any restrictions should be placed on the way these non-Zunis use Zuni seeds?_____ Why?_____

   _____

   [NO restrictions: go to #3; YES: cont.] What restrictions?_____
3. Do you think that Zuni farmers should sell traditional Zuni crops to other Zuni people?___ Why?_____

   _____
4. Do you think that Zuni farmers should sell traditional Zuni crops (not seeds) to non-Zuni people (i.e. white people who may want them for commercial reasons)?___ Why?_____
5. Would you like to plant more traditional Zuni seeds?___ Why?_____

   _____
6. Would you be willing to share your traditional Zuni seeds with other Zuni farmers/gardeners?_____
   Why?_____

   [IF YES] Can we put your name on a list to share seed with other Zunis if you had some to spare?_____
7. For each of the traditional Zuni seeds that you have, can you answer the following questions?
   - Where did you get the seed?
   - Where did the seed originally come from? What is the original source? For example, if you got the seed from your mother, did she originally get it from her family, or from Hopis?
   - What year did you last plant these seeds?
   - How much of these seeds do you have now?
   - Are you willing to share these seeds with other Zunis through the ZCS network by having your name on a list?

CORN	WHERE DID YOU GET SEED?	ORIGINAL SOURCE OF SEED?	YEAR LAST PLANTED?	HOW MUCH SEED?	WILLING TO SHARE?
Zuni blue corn ***+i'akwa, chu:+i'ana***					
Zuni yellow corn ***+upts'ikwa, chu:+upts'inna***					
Zuni red corn ***shilowakwa, chu:shilowa***					
Zuni white corn ***k'ohakwa, chu:k'ohanna***					
Zuni purple/black corn ***k'wi'nikwa, chu:k'winna***					
Zuni multicolored corn ***k'uchuchukwa***					
Zuni popcorn ***shibidaku***					
Zuni sweet corn ***shots'i'do, shots'i'do-chuwe***					
mi:ts'ininikwa					
SQUASH	**WHERE DID YOU GET SEED?**	**ORIGINAL SOURCE OF SEED?**	**YEAR LAST PLANTED?**	**HOW MUCH SEED?**	**WILLING TO SHARE?**
me:mo'le					
mo:deya+a					
mo:ki'si					

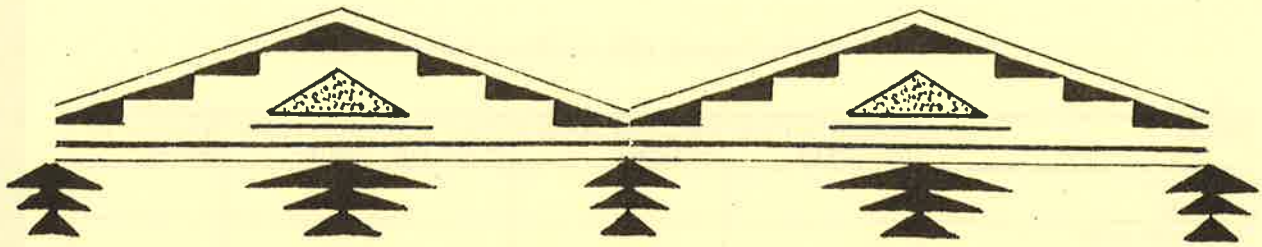
The folk varieties survey of The Zuni Folk Varieties Project.

BEANS	WHERE DID YOU GET SEED?	ORIGINAL SOURCE OF SEED?	YEAR LAST PLANTED?	HOW MUCH SEED?	WILLING TO SHARE?
Zuni pinto ***nobindu***					
Zuni cattle bean ***nowa:kyashi***					
Zuni yellow bean ***no+upts'i***					
Zuni blue bean ***no+i'tana***					
Zuni red bean ***noshilowa***					
Zuni purple string bean ***+abiya:we***					

GOURDS	WHERE DID YOU GET SEED?	ORIGINAL SOURCE OF SEED?	YEAR LAST PLANTED?	HOW MUCH SEED?	WILLING TO SHARE?
Zuni dipper ***shopba shok'onne***					
Zuni rattle ***shopba chi'monne***					
Other Zuni gourd name:					

MELONS	WHERE DID YOU GET SEED?	ORIGINAL SOURCE OF SEED?	YEAR LAST PLANTED?	HOW MUCH SEED?	WILLING TO SHARE?
Zuni red watermelon ***mol'aknana***					
Zuni yellow watermelon ***mol'aknana +upts'inna***					
Zuni white watermelon ***mol'aknana k'ohanna***					
Zuni cantaloupe ***melu:na***					
Zuni cantaloupe ***medochilo***					

GARDEN VEGETABLES	WHERE DID YOU GET SEED?	ORIGINAL SOURCE OF SEED?	YEAR LAST PLANTED?	HOW MUCH SEED?	WILLING TO SHARE?
Zuni chile ***k'ola***					
Zuni tomatillo ***k'e:ts'ido'kya***					
Zuni cilantro ***kulandu***					
var:					
var:					



Practical Pamphlet for Saving Seeds of Zuni Folk Varieties Available for Free

Saving Zuni Folk Varieties for Zuni Use Today and Tomorrow is the title of a pamphlet put together by the Zuni Folk Varieties Project for the Zuni community. The purpose of the pamphlet is to help Zuni farmers and gardeners who are interested in keeping Zuni traditional crop varieties healthy for their own use, as well as keeping those varieties so that they will be available for use by future generations of Zuni farmers and gardeners. As outlined in the pamphlet, there are two simple steps useful for accomplishing this goal: first, avoid crossing between Zuni and non-Zuni varieties of the same crop; and, second, make sure that Zuni varieties and the seeds saved from them are healthy and strong. For more details about ways to accomplish these goals come pick up a free copy of ***Saving Zuni Folk Varieties for Zuni Use Today and Tomorrow*** from the Zuni Sustainable Agriculture Project at the Zuni Conservation Project Office located at the fairgrounds. An exerpt from the pamphlet is reproduced below.

Exerpt from Saving Zuni Folk Crop Varieties for Zuni Farming Today and Tomorrow

For generation after generation Zuni farmers and gardeners have developed and kept many different crops and crop varieties. Zuni folk crop varieties are valuable for the Zuni community because they can grow and produce a reliable harvest at Zuni, and also because these varieties have important religious and social values. However, there have been changes at Zuni in recent times, with fewer households farming or gardening, and with fewer crops being grown. There is a danger that the Zuni community may lose some of its crop varieties. As a new generation of Zuni people become interested in farming and gardening they are looking for experienced Zuni people who can give them advice and support, and for the seeds of Zuni folk varieties that are adapted to Zuni growing conditions and Zuni needs.

The purpose of this pamphlet is to help Zuni farmers and gardeners save Zuni folk varieties for their own use today, and for use by future generations of Zunis.

The two basic steps for doing this are to 1) avoid mixing of Zuni folk varieties with other varieties, and 2) keep Zuni folk varieties and the seeds that are saved for planting healthy.

Avoiding mixing of varieties

Zuni farmers have been keeping different varieties of corn, beans, and other crops separate from each

other from year to year from the beginning. That is, they avoided mixing (or contamination) of one variety with another. For example, farmers at Zuni today grow many different varieties of corn, including Zuni varieties such as blue corn, white corn, red corn, and speckled corn. If Zuni farmers had pooled all of their corn varieties into one big Zuni corn mix then in a very short time they would have had just one kind of corn, a mixture of all these varieties. By keeping these varieties separate instead of putting them all together as one Zuni corn mix, Zuni farmers have maintained diverse varieties known to have special qualities that are different from each other such as color, taste, texture, length of growing season, and water and soil needs. By keeping their varieties separate year after year, farmers and gardeners keep the special qualities they want and expect. Zuni farmers are doing what researchers and plant breeders call keeping the varieties "true to type."

To keep Zuni folk varieties for use by Zuni people today and in the future, avoid growing them near non-Zuni (commercial) varieties of the same crop.

However, even while many of these varieties have been kept at Zuni for a long time, this does not mean that they have not changed during this time. In fact, these varieties are always changing slowly as families select which varieties and which seeds to plant each spring; as the weather, soil, water, and pests at Zuni change over the years; and as farmers and gardeners experiment with their varieties, trying to improve them or make them different in some way. Despite these small changes, farmers and gardeners have made sure that the important characters that make Zuni blue corn (***łi'akwa***) Zuni blue corn, or Zuni purple string beans (***łabiya:we***) Zuni purple string beans for example, have not been lost.

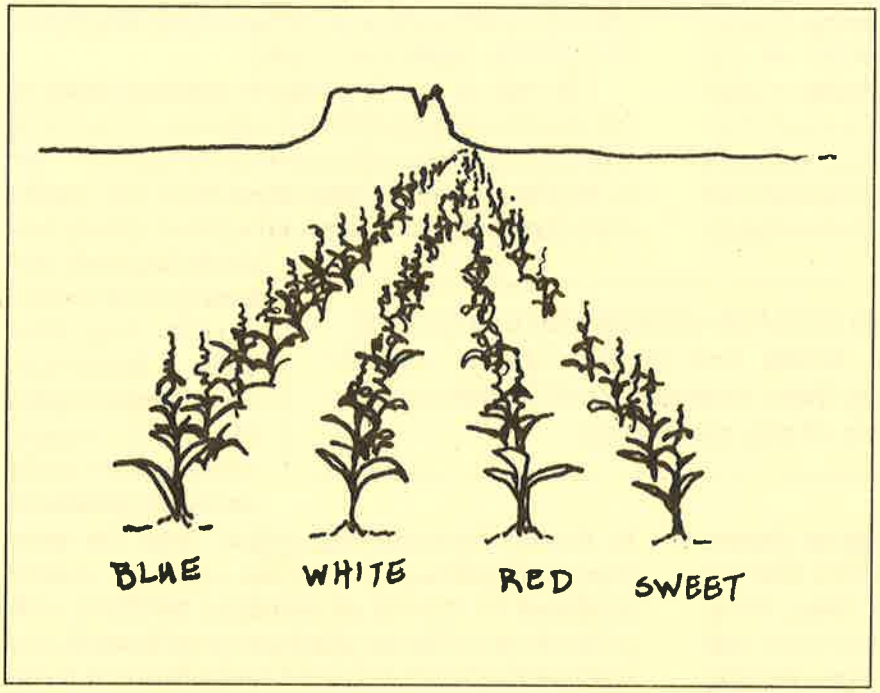
Not only can a Zuni folk variety be contaminated by another Zuni folk variety, but also by a commercial (non-Zuni) variety of the same crop. Contamination by a commercial variety can be a more serious problem because commercial varieties are so different, and are not usually adapted to the growing conditions at Zuni.

The way to avoid mixing or contamination of varieties is to keep different varieties of the same crop from crossing with each other in the field. That is, to prevent pollen (***'oneyanne***) from one variety from fertilizing the flowers on another variety and producing seeds that are a cross of the two parent varieties. Table 1 below lists some common types of Zuni crops, whether their seeds are usually produced by flowers fertilized with pollen from the same plant (self-pollinated), or if the seeds are usually produced by flowers on one plant fertilized with pollen from a different plant (cross-pollinated), and whether the pollen is carried to the flower it fertilizes by insects or the wind.

Knowing the way different crops are pollinated can help farmers and gardeners to avoid contamina-

Table 1. Pollination of some common Zuni crops

Crop	Usually self-pollinated or cross-pollinated	How pollen carried
corn	cross-pollinated	wind
beans	self-pollinated	gravity/insects
squash	both	insects
melons	both	insects
watermelon	both	insects
gourds	both	insects (moths)
chiles	both	insects
cilantro	cross-pollinated	insects
wheat	self-pollinated	gravity/wind
peaches	both	insects



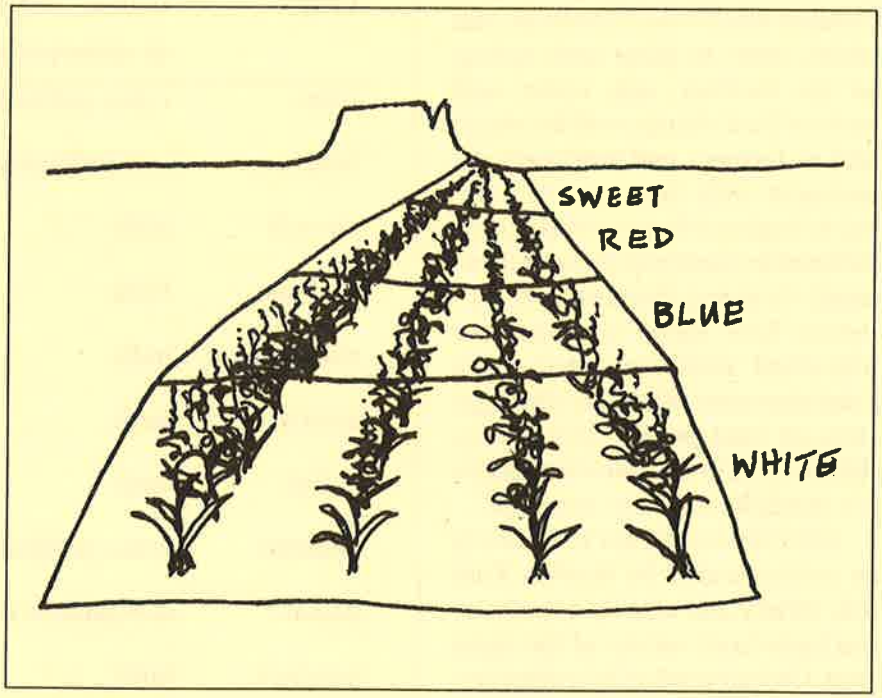
It is hard to avoid crossing between different varieties of corn planted in rows. D. Soleri

tion between varieties of the same crop.

So how do you prevent contamination of Zuni folk varieties if you are saving seeds for planting? The best way to prevent contamination is not to plant different varieties next to each other. If you want to try growing a commercial variety and a Zuni variety of a crop, field corn for example, then planting them in different locations is the best way to keep them from crossing since corn is cross-pollinated by the wind. This takes some planning and also some cooperation between families who have garden plots or fields next to each other. In general, for wind-pollinated crops its good to separate varieties by at least 1 mile. In addition, planting varieties in blocks instead of in single long rows helps because it makes a larger area of each variety, and therefore more opportunity for the pollen of a variety to pollinate flowers on other plants of that same variety.

For insect-pollinated crops like melons, separation of different varieties of the same crop by 1/2 mile is recommended. However, separating varieties by such big distances is not usually possible or practical at Zuni. Therefore, a good rule of thumb for any type of crop, is not to grow commercial varieties right next to, or mixed in with, Zuni folk varieties. In addition, saving seed only from those plants right in the middle of a plot planted to that variety, especially for wind-pollinated crops, can help minimize contamination. If you are really concerned about avoiding contamination of a particular Zuni folk crop variety, the best solution may be to plant it in an area where no other fields or gardens are being planted.

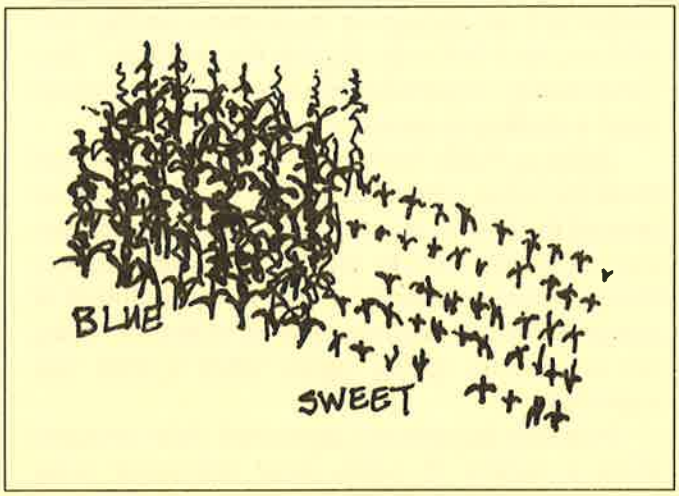
Another way of separating varieties to prevent contamination is to make sure that one variety does not have flowers and/or produce pollen at the same time as another variety of the same crop. Here crossing between the varieties is prevented by time instead of distance. This is the case with blue corn and some kinds of sweet corn because blue corn takes longer to produce pollen, even when planted at the same time. For other



Planting different varieties of corn in blocks helps reduce crossing between them. D. Soleri

varieties that produce pollen at the same time when planted at the same time, if the season is long enough planting them at different times can help prevent crossing.

For more information and practical ideas about saving Zuni folk crop varieties for Zuni people today and tomorrow, pick up a free copy of this pamphlet at the Zuni Sustainable Agriculture Project office, at the Zuni Conservation Project offices, at the fairgrounds.



Differences in timing of planting and of flower or pollen production will help avoid crossing between different varieties of the same crop. D. Soleri

Zuni Peach Orchards, Part III

by David Cleveland, Donald Eriacho, Daniela Soleri, Lygatie Laate, and Roy Keys

In this third *Zuni Farming* article on peach orchards we report on the final results of interviews with Zuni households, a survey of orchards at Zuni, and ideas for rehabilitating the orchard at Dowa Yalanne.

Starting Peach Trees

Donald Eriacho completed 29 interviews last summer and fall with households with family rights to peach orchards, 24 of these on Dowa Yalanne (the interview form he used was published in *Zuni Farming* No. 2, pages 14-15).

Of the 29 households interviewed, 18 remembered saving seeds to plant. The seed was usually left outside over the winter to freeze, which also cracked the shell. Most people remember treating them in some other way, most commonly soaking them in water or cracking the shells to help them sprout. Some people saved seeds for planting in sacks or cans, others recall that the seeds that fell from the trees just sprouted in the spring, or that they were buried or covered with piles of dirt. One person mentioned that as peaches were prepared for drying their pits were removed and thrown in piles, and then covered with dirt.

Twelve of the households remember transplanting seedlings from sprouted seeds, some mentioned that they would be placed between existing trees, where old trees were drying up, or to expand the orchard. One family carried the seedlings to Dowa Yalanne in burlap sacks after starting them in the silty, moist soil at Eustace Lake.

A previous article (*Zuni Farming* No. 2, p.1) described the traditional way some Zuni farmers started new peach trees by splitting up old stumps that had healthy, young shoots. This is called ***da-batchishna*** ("field rooting" of hardwood cuttings), and is a way to get new trees from those that were old but known to have good fruit. Two of the other 28 households interviewed as part of our survey also mentioned that they used to use ***dabatchishna***, and some others knew about it but didn't remember their families using it.

Tending and Harvesting Peach Trees

The households interviewed remembered last tending their orchards between 1928 and 1982, with an average of 1952. Most of the households took care of their peach trees in several ways, including pruning, irrigating with rain or spring water, and protecting from wind, pests and freezing. Weeding was done by 26 of the families, as was pruning, usually just of ***da k'us na:we*** (dry branches).

Twenty households remembered directing rainwater to the trees, this included building berms or trenches down slope from the trees to hold water (11 households said this), and digging canals to the trees (5 households), for example from where water was collected by flat rocks. In addition to harvesting rainwater, ten said they brought water to their

orchards from springs or check dams, though two of these said they only did this for seedlings. They used canals, or carried it in buckets or cans, and one used a donkey to haul the water.

Six households remembered protecting the trees from the wind, usually by hoeing or placing stones around the base of the trees, while 6 others said that natural protection was provided by nearby mesas. One person mentioned that they left a windbreak of junipers. Some remembered piles of manure being set on fire on spring nights when a frost was expected.

Fourteen households protected their orchards from a variety of pests, most important being porcupines, chipmunks and birds, with scaring and repellent devices, traps, cats, and fences. Porcupines when caught were a favorite meal.

During ripening and harvesting people lived in the orchards in small stone houses, three-walled shelters, or tents. Many of the peaches were split and dried on flat rocks, boards, baskets, flour sacks, or screens woven from willow branches. One person remembered splitting the peaches with hand-made wooden knives. Because they were not as sharp as metal knives, it was easy to slice and remove the pit with one movement without cutting your hand. The dried peaches were carried back to the village by the people on burros or in wagons, where they were stored for eating during the winter, usually after being boiled. Others remembered using the peaches in pies, jam, and canning, or even baking them in bread ovens with bread. Seventeen of the households traded peaches, mostly for dried meat with Navajos who came to the orchards for a supply of the delicious Zuni peaches. Three families mentioned trading or giving away peaches to family and neighbors.

Zuni Peach Folk Varieties

Of the 29 households interviewed, most remembered three Zuni varieties of peaches. ***Ts'ikkwa batchi*** (22 households), ***hekkwilupts'i*** (19 households) and ***dowa mo:chikwa datdanne*** (8 households). Another 6 households mentioned ***dikwana*** (regular) or Indian peaches, which are probably ***dowa***. One person remembered growing a commercial variety (probably Alberta) successfully at ***Alabatsa*** in a spot which had lots of water.

Of the 29 households interviewed, 25 answered questions about differences between Zuni peach trees and commercial peach trees if grown at Zuni, and between Zuni peaches and commercial peaches. Twenty-one thought that Zuni peach trees are different, 14 of these mentioning that they need less water and/or are smaller. Three others said Zuni peach trees need less care, and two others mentioned differences in leaves.

Twenty-four thought that Zuni peaches are different than commercial varieties. Most of these families (23) believe that Zuni peach varieties are tastier, sweeter and/or smaller than commercial varieties.

Saving and Controlling the Use of Zuni Peach Seeds

Two of the questions on the survey ask about the value of Zuni peach folk varieties and control over them. The first question asks "Is it important to make sure that old Zuni peach varieties are not lost? Why?" Out of 25 answers, 24 were "yes," and 1 "don't know." Of the 17 who explained their answer, 10 said only that it was important to save Zuni peaches "for our children," 3 said Zuni peaches are part of Zuni culture, and the other four mentioned that Zuni peaches are more nutritious and easier to slice and dry than modern varieties, will help their children to make money, and are easier to care for now with modern technology.

The second question is "Should non-Zunis be given seeds of Zuni Peaches? Why?" Out of 24 answers, 17 said "no," 5 said "yes," and 1 said "don't know." Of the 19 who explained their answer, 9 said simply that Zuni peaches were only for Zunis, 4 added that outsiders would sell Zuni peaches for money or that Zuni peaches should not be commercialized. Other explanations of "no" answers included that the seeds were from the ancestors and that Zunis have given away too much already. One person qualified their "no" answer by stating that maybe it would be all right to give Zuni peaches to outsiders later if more information on how they would be used became available. Three people explained their "yes" answers by saying that Zunis could help outsiders out, that an arrangement could be worked out, and only if Zunis can control the peach seeds. In discussions during several of the interviews the image of Zuni farmers removing the pits before handing over the peaches to outsiders made everyone laugh, but highlighted the practical problems of controlling seeds when selling or giving away fresh peaches.

Surveying Peach Orchards and Living Trees

In July, agroforestry and fruit tree expert Roy Keys from Tucson, Arizona visited Zuni to assess the condition of living Zuni peach trees and talk with farmers. He was accompanied on visits to orchards by Lygatie Laate, Donald Eriacho, Daniela Soleri, and David Cleveland. We visited three orchards with living trees, and one with no living trees. Plant pathologist Tom Orum also visited Zuni last summer, and looked at the peach trees in Lygatie's orchard at ***Kwili Yalanne***.

A few Zuni peach trees still bear fruit at Zuni. Photo by D. Cleveland

Kwili Yalanne (Twin Buttes). Lygatie Laate's orchard at ***Kwili Yalanne*** contains over 30 trees of different ages. Some of the trees were survivors from the orchard that had been tended by Lygatie's grandfather, and Lygatie has been pruning off the dead branches. The ends of the branches on many of these trees were dying, and some trees had a gummy substance oozing from their bark. Tom Orum took a branch with this substance on it to the plant pathology lab at the University of Arizona. He was not able to tell what the specific problem was, but it may be a viral or bacterial infection, or perhaps a zinc deficiency. These problems would be made worse by drought.

Lygatie had also planted quite a few small peach seedlings in his orchard, placing them at the end of catchment basins, many of which had not survived, because the heavy runoff had buried them under soil. Other problems that may have contributed to the death of the seedlings are browsing by deer and rodents, and lack of water. Although Lygatie built berms around the seedlings to collect the rainfall runoff, the seedlings would have had a short time in which to establish a root system before the soil dried during the summer dry period after planting in the spring. Lygatie dug down 6 inches in one micro-catchment without finding any sign of moisture.

The trees in Lygatie's orchard were definitely susceptible to late frosts. The trees begin to flower before May, with budbreak probably in April. Many of the surviving seedlings showed evidence of frost damage, as well as many of the larger trees, which had very few peaches.

K:osena (Pia Mesa). We visited the two adjacent orchards here with Thelma Shishie and Curtis Gihate, two members of the family that used to tend them. Thelma remembers that during peach harvesting when she was a young girl, she would come up to the orchard on Friday's after she finished school. Then on Sunday her parents would load her up with flour sacks of dried peaches to carry home. They used to plant corn between the peach trees and had a good crop.

One orchard directly at the foot of the mesa wall was quite large, with over 100 trees in an area of about one acre. At least half of the trees were still alive, even though they had not received much attention in many years. There was another site on a lower bench, but only a few trees located along a drainage survived there. This second site seems to get less runoff and is more exposed to drying wind than the higher site. The higher site slopes in toward the base of the mesa wall, so that it traps water, and the higher outer lip protects the trees from the Western winds. Neither of the orchards were fenced, but the upper one was protected by natural rock formations from grazing stock, whereas the lower one was not. Thelma and Curtis said that there had been heavy grazing over the years in the lower site and believe that this is the cause for so few trees surviving. They are now trying to build a fence to keep stock out so that they can rehabilitate this site.

The trees here seemed healthier and more productive than at ***Kwili Yalanne***. There were a lot of green peaches on the trees, so frost was not as big of a problem either, at least not last spring. There were disease problems similar to those at ***Kwili Yalanne***, but not as bad.

Old Gallup Road. The orchard located here is on a flat, exposed sand field, approximately one acre in size, and fenced. The planting arrangement here is different than at the other sites, consisting of several closely spaced trees forming a circle up to approximately six feet in diameter. Lygatie remembered that the trees here were planted from seedlings grown from non-Zuni seeds, probably from store-bought fruit. He thinks the seeds were started in tin cans and then transplanted.

The trees, in general, are larger than at the other orchards. Many of the main stems were dead, and the remaining trees are in need of pruning and thinning. Some of the growing tips of the branches were dying back as well. Although most of the trees were fairly healthy, none of them bore any fruit this year, perhaps because of freezing, since the site is not well-protected.

Heshoda Yalla. We visited this very large orchard site slightly north of Lygatie's ***Kwili Yalanne*** orchard. The trees were all dead, and because of the juniper and piñon trees, it was difficult to determine which were peach tree stumps. But at least one area contained stumps at very even spacing (approximately 12 X 12 feet), suggesting a well-designed planting site.

Alabatsa (Trapped Rock). We were not able to get to this orchard during Roy's visit because of locked gates, but there may be an alternate, easier route. One orchard there is reported by the family owning it to have no living trees, but another orchard is said to have several trees still alive.

Planning for Reestablishing Zuni Orchards

Dowa Yalanne (Corn Mountain) is the site we are concentrating on to begin rehabilitating Zuni peach orchards. We are putting together a proposal for rehabilitating this orchard based on peoples' ideas expressed during our interviews, and will meet with interested families to discuss it before submitting proposals for funding. If anyone has any ideas or comments on what we've done so far, please contact Donald Eriacho at the Zuni Conservation Project, 782-5851/5852.

On the survey we asked people what they thought about different activities that could be part of an orchard project at Dowa Yalanne.

Mapping. Most people agreed that mapping the orchard was a good idea, to help identify which plots belonged to which families. Some people mentioned the need to avoid religious sites during mapping of the orchard. Fred Bowannie, Jr. and Andrew Laahty have mapped the perimeter and some of the main roads using the Conservation Project's Global Positioning System.

Fencing. Most households interviewed felt that the orchard needed to be fenced to keep out sheep. The area of the Dowa Yalanne orchard is 242 acres, and the eastern and northern boundary that needs to be fenced is 2.4 miles. It would cost about $7,500 for materials to fence this with sheep-proof wire on the bottom and four strands of barbed wire on top. The eastern-most dirt road provides access to the center of the orchard and is in fairly good shape.

Peach tree planting and care. The ZSAP will help interested community members combine the expertise of knowledgeable Zuni farmers and some outside assistance to develop the best ideas for peach tree planting and care at Zuni. Pruning workshops are a good example of how the project could help. Pruning can make a tree more vigorous, help it combat disease, encourage more fruit production, and make the trees less vulnerable to damage by wind or animals. Peaches are only produced on last year's growth, and pruning can increase fruit production quickly, because it encourages new shoots the following year.

Most of those interviewed in the orchard survey were interested in trying grafting and other forms of vegetative propagation. Experts can be brought in for advice on how to increase and improve the quality of the root system produced, encourage shoots appropriate for ***dabatchishna,*** and ideas for caring for the transplanted shoot to improve chances of the shoot surviving. Zuni people interested in pruning and other workshops about peach tree care and planting should contact Donald Eriacho at the Zuni Conservation Project office (782-5851/5852).

The Zuni Resource Development Plan

The *Zuni Resource Development Plan: a Program of Action for Sustainable Resource Development*, edited by James Enote, Steven Albert, and Kevin Webb was published in November 1993 by the Zuni Conservation Project. A draft of the entire *Zuni Resource Development Plan* was reviewed by a BIA review team. The team met with the Conservation Project several times in Zuni and Albuquerque. The Zuni Tribal Council signed the plan on November 10, 1993, and it was submitted by the Tribe to Secretary of Interior Bruce Babbit in Washington, D.C. (The U.S. Department of Interior includes the Bureau of Indian Affairs, U.S. Geological Survey, Bureau of Reclamation, and Bureau of Land Management.)

The Plan includes a chapter (and an appendix with background information) by the Zuni Sustainable Agriculture and Zuni Folk Varieties Projects. The main purpose of these projects is to help the Zuni community create a plan to guide further development of sustainable Zuni agriculture. The Plan is a tool to be used by the Zuni community for a) more detailed planning and policy development, b) assessing the environmental and social sustainability of proposed agricultural projects, and c) acquiring funding from outside sources.

Community input is the key to creating a good plan for sustainable agriculture and the Sustainable Agriculture and Folk Varieties Projects have been working to have community participation in this planning process. For example, in our plan we discussed important areas for policy development to support sustainable agriculture. Ideas about policy options grew during the course of the project through interviews and informal discussions with community members, the Tribal Council, Zuni Irrigation Association, the Cultural Resources Advisory Team, and others on the Conservation Project team.

On-going planning was discussed at several Nutria Irrigation Unit/ZSAP public meetings during 1993, and preliminary drafts of our plan were distributed within the Zuni community, and discussed at one public meeting.

Planning didn't stop with publication of the Plan, but will continue throughout the life of the Zuni Sustainable Agriculture Project, along with implementation. The plan and appendix with supporting information in the *Zuni Resource Development Plan* is a good foundation for the future. With it we can begin implementation, and continue collecting and analyzing information, and helping the Zuni community to become more and more involved, as we move from Nutria to include the other four farming districts.

Copies of the Zuni Resource Development Plan *are available in the Zuni Conservation Project Office (782-5851/5852).*

A work party of the Pescado Irrigation Unit repairing a culvert. Photo by D. Eriacho

Intertribal Agriculture Council Meeting

by Donald Eriacho

I was invited by Ross Racine, Natural Resource Director of the Intertribal Agriculture Council, to be one of the guest speakers on sustainable agriculture at their Seventh annual Intertribal Agriculture Symposium on November 3rd of last year. The Symposium was hosted and co-sponsored by the Seminole Tribe of Florida.

The Sustainable Agriculture part of the symposium focused on crop management, family values, and traditional farming. During the introductions, Ross Racine cited some key facts from the Center for Rural Affairs, in Walthill, Nebraska. Over time most colleges of agriculture have drifted into serving interests beyond the traditional farming communities that once relied on them as a primary source of information. Research and extension activities have become less useful to the small and medium size family farmers and sustainable agriculture producers. The interests served are the more powerful farm groups and active business industries that can afford to subsidize research.

Consequently most of the research conducted at Land Grant Universities is at least partially funded by private companies, and does not address the current needs of small- and medium-sized farmers, who are the backbone of our rural communities. Rather, the research agenda is driven by powerful interests whose needs could be met in other ways. In a competitive, capitalist economy this offers a substantial subsidy to one model of agriculture at the expense of others. Thus, our Land Grant Universities have followed social and economic trends rather than leading. Emphasis on education has diminished as the pressure to conduct research with publishable results has increased.

At stake in these decisions about how agricultural research and extension are conducted is the health of consumers, workers, and animals, the quality of the environment, and the regeneration of resources. Many of the new technologies produced and used in recent decades have had detrimental health and environmental consequences. Sustainable agriculture research and development offer a strategy for both reducing potentially polluting agricultural inputs (like commercial pesticides and fertilizers) and the erosion of a land base, and supporting owner-operated family farms in which farmers, labor, and management skills, not their capital, are their greatest strength and competitive advantage.

Dave Vetter was the first speaker in the sustainable agriculture session. He talked about their 280 acre family farm in Marquette, Nebraska. They have had their farm since 1953 when it was bought by his grandfather and father. They had to lease their farm out due to his fathers' health problems, but after 15 years Dave Vetter took over the family farm again in 1975. He started to farm totally organically, that is, farming without applying any manufactured commercial fertilizers, pesticides or herbicides. He does this out of his conviction that its right for the land. At the present time the family grows corn, popcorn, and soybeans using crop rotations to enhance the quality of their soil and the natural environment of their farm.

But he also has to make a living, and he has been successful not only in growing, but in marketing a line of organic grain products. The operation now has storage for 40,000 bushels of grain, and modern drying, cleaning, packaging and storing equipment, including a 14,000-square foot refrigerated warehouse.

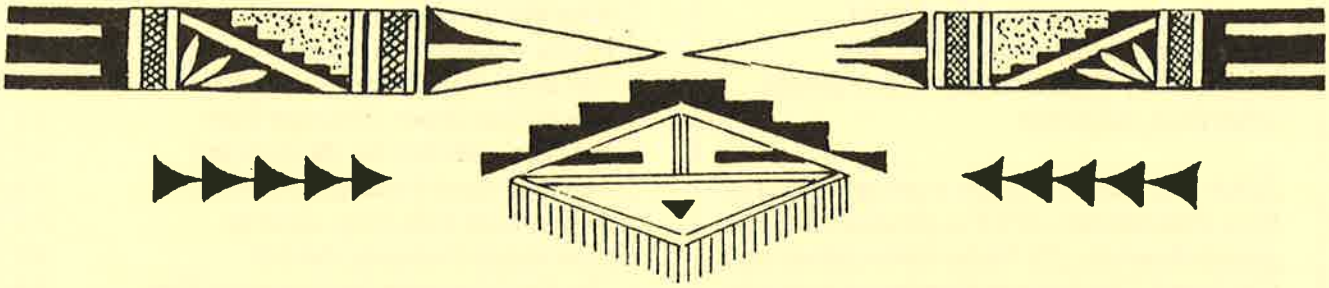
In a recent issue of *New Farm* magazine Vetter said "When you're farming organically, you shoot for the highest net return for the whole system—not just the most return from a single crop in a single year. Your goal is steady, stable improvement. You don't try to go for broke all the time." In the future he intends to divide his farm into 10-acre units, with fruit and nut trees, and other plants to attract beneficial insects around them. The reason for this is to create more biological diversity. "When you do that, your management actually becomes simpler, because you always have more options. And the more options you have, the more fun farming is."

Another point that was brought out in the morning session of the Symposium was the fact that these types of gatherings bring out the elderly and the middle aged, but not our youth. "Where are our youth?" asked one of the leaders of Jiracarilla Apache nation in New Mexico. He said he brought some young people from his community to the meetings because our young people need to get involved at the earliest stage of their lives so they will know how things are run. They are the ones who will be taking over soon to lead their people.

As we understand here in Zuni, whatever we do—farming, ranching, or craft-making—it's done for

our children and their children. But we also understand that we should be doing these types of things in ways that protects our lands, culture and our general way of life for generations to come.

All in all, the Intertribal Agricultural Council Symposium was very educational and rewarding to me, and I'm proud to have been asked to travel to the far corner of the earth to talk about our Zuni Sustainable Agriculture and Folk Varieties Projects with others who are involved in sustainable agriculture. We can only hope that our contact with the outside world will benefit everyone in the future.



Extension Service in Zuni

by Darrell Rothlisberger

New Mexico State University's Cooperative Extension Service once again, after approximately 15 years, has an office in Zuni. This is the result of work by the Zuni community, Tribal Council and other leaders.

In February of this year I joined New Mexico State University's Cooperative Extension Service as the Extension Agent for Agriculture and 4-H at Zuni. I see great potential for the role of extension in this community. I am a graduate of New Mexico State University, with a background in agriculture, specifically beef cattle. I'm also a former 4-H, member, and I enjoy working with youth in 4-H, and providing them with opportunities for growth. In the short time I have been in Zuni, I see much creativity and traditional knowledge here.

No matter what 4-H projects kids are involved in, they learn skills that increase self-esteem, and will benefit them and the Zuni community throughout their lives.

With the opportunities introduced through extension, the possibilities for economic development are great. This will be done while protecting Zuni cultural values and tradition.

Opportunities include looking for non-Zuni blue corn varieties that can be sold in farmers' market at Zuni. With the Zuni Sustainable Agriculture Project, we planted test plots of blue corn in several locations across the reservation this summer. A tour of farmers' markets in northern New Mexico in July, arranged by the Cooperative Extension Service, helped Zuni farmers to see how farmers' markets function, and to visit with farmers and crafts people whose main market place is a farmers' market. Hopefully, the large number of tourists that visit Zuni would be interested in a Zuni farmers' market (see "Is there a Market for Zuni Crops?", page 18). Other areas being explored are beekeeping for honey production, home food preservation including canning, and livestock production.

I plan to bring subject matter specialists to Zuni from NMSU to present workshops. Zuni organizations and farmers, and other local experts, will be used to make information as appropriate as possible for Zuni.

I'll be cooperating with the Zuni Sustainable Agriculture Project and the Zuni Conservation Project in my work. Stop by for a visit at the Zuni Cooperative Extension Service office in the Zuni Conservation Project offices near the fair grounds, or call 782-4491/4495.

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In this issue of ***ZUNI FARMING***

Let Us Know What You Think
about any of the articles in this newsletter, or any other issues concerning farming and gardening at Zuni. You can talk with us at the Zuni Conservation Project offices (near the Fair Grounds, 782-5851/2), or write to us (P.O. Drawer 630, Zuni, NM 87327).

To:

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