

## Session 2 General Discussion

**Chairman Dr. Ryoichi Matsunaga:** In this session we are talking about resilience in upland crop production. The first two speakers presented mainly about conservation agriculture through the introduction of no-tillage or minimum-tillage cultivation. We have learned a lot of things about what is happening in Africa and China. I think there are a lot of questions and comments for the first two speakers.

**Mr. Hitoshi Nakagawa:** Hitoshi Nakagawa from Japan. To the first presentation, probably you cannot answer, but the technology looks to me to be coming back to traditional technology. How about new technology such as genetically-modified (GM) crops? It is very useful for non-tilling by using Roundup Ready or something.

To Prof. Li probably it is the same question, because in Argentina they achieved the goal of a non-tilling cultivation system, with a rotation between maize and soybean by using Roundup Ready. They really achieved the goal of non-tilling, not less tilling.

What do you think about these technologies? This is a question for the two presenters.

**Chairman:** Okay, two speakers please. First, Prof. Li.

**Prof. Li:** This gentleman asked a very key question on a very key point. In America, since the 1930s America started no-tillage, but it extended conservation tillage only after the 1960s, based on two successful technologies. One is no-till seeders. Another is commercial herbicide. What you just asked is that in Argentina and Brazil, Brazil largely extended conservation agriculture with no-tillage after 1992. The number one reason for conservation agriculture extension is soybean with GM. So I think for doing conservation agriculture we need machinery, we need to find a way to solve the problem of weed control. That is my answer.

**Chairman:** Do you have any plan to introduce GM soybeans or Roundup Ready soybeans, such herbicide-tolerant soybeans, for the promotion of no-tillage cultivation? Such technology, a combination of GM crops and no-tillage cultivation, would promote conservation agriculture, he said. So how about your comment?

**Prof. Li:** GM only happens in Brazil and Argentina for push conservation agriculture. In China we do not do anything relating to this. We only develop our machinery, our technology. We try to reduce herbicide usage; we try to use machinery to kill, to cut weeds, not follow the way of GM.

**Chairman:** Thank you very much. And Dr. Nagumo, Roundup Ready cotton has already been introduced in Burkina Faso, I think.

**Dr. Nagumo:** Ah really, I did not know about that.

**Chairman:** Forget about it, it is just a comment.

**Dr. Nagumo:** Thank you very much for your question. Actually I am working on land degradation due to promotion of land-ready corn varieties in the Philippines. In that case I think that it is very much with non-till farming, but if the farmer misuses, sometimes the land becomes very bare, everything is nothing. In that case, at the start of the rainy season soil erosion occurs. It is what happened in the Philippines. So the Roundup Ready corn I think in principle is good, and for non-till farming, but if you misuse this new technique it gives a very serious problem in the near future. We want to study in more detail and we want to learn this allay this problem.

**Mr. Nakagawa:** Actually on the first question, in Africa that presentation looks to me to be really coming back

to the old traditional technologies, do you not think so? It is just a hole and it is very labor intensive. So is it really like this or do they need another new technology to improve their cultivation system in Africa?

**Dr. Nagumo:** I think there are very different stages of farmers from only no-animals and only farming by hand, then the next step is with animal traction, then more developed areas are using tractors. So the FAO according to my knowledge are ready for different types of conservation farming technologies, and then they are trying to develop. But in the presentation maybe he wants to insist that it is not yet promoted, so it needs more promotion. For that purpose it needs more institutional support, government commitment, more supporting systems should be established. I imagine this is what he wants to say.

**Chairman:** Thank you very much. Another question for non-tillage cultivation in Africa and in China?

**Mr. Koyama:** My name is Koyama, I'm from JIRCAS. Could you elaborate a little on the relationship between resilience, which is the main theme of this symposium, and conservation agriculture technologies? Maybe it is good for stabilization of yield instead of increase of yield. Increase of yield is also important, but is it useful for stabilization? Do you have any evidence? That kind of information, if you have it, please.

**Chairman:** I think Prof. Li skipped some slides about the long-term effect on resilience.

**Prof. Li:** Can you repeat the question again?

**Mr. Koyama:** Is your conservation tillage good for the stabilization of yield in the long run or not? Do you have any results from your experiments?

**Chairman:** Sometimes you may have a severe drought. In that year you have some effectiveness of conservation tillage on the yield stabilization.

**Mr. Koyama:** Yes, I saw the graph, the line below is of normal cultivation and then a little bit above is the conservation tillage yield, but they seem to move in a parallel way. Stabilization is very important.

**Prof. Li:** For the yield we cannot get a similar yield of something like the line. Now, conservation agriculture mostly happens in northern China. If we have a lot of rain, the total yield can be higher. If it is dryer, the yield will be lower. So in a dry year the difference between conservation agriculture and conventional tillage is greater than the year with more rain, so the difference does not smoothly increase as in what you showed.

**Chairman:** Thank you very much. Now we move on to the salinity problem. Dr. Shirokova presented to us the situation in Uzbekistan. Do you have any comments or questions on her presentation?

**Mr. Yukio Okuda, JIRCAS:** My name is Yukio Okuda from JIRCAS. We are studying the salinization problem in Uzbekistan. At that time we knew that governmental support to the farmers is very important, but not only governmental support but also farmers' contribution is necessary to maintain the irrigation function or drainage function. So I would like to ask Dr. Shirokova what kind of activity is necessary in order to obtain such NGOs' or farmers' contributions.

**Dr. Shirokova:** Thank you very much for your question. You mean NGOs?

**Mr. Okuda:** Farmers.

**Dr. Shirokova:** Some places in Uzbekistan have a historical method to reduce salinity by irrigation with organic manure. For example, in the Khorezm region they prepare a special suspension and reduce the effect of soil

salinity to the plans during irrigation. I think the schedule of irrigation is very important for reducing salinity during the vegetation of the cotton for example.

Distribution of water is a very ill question. If we can irrigate often, like in modern technology, we can reduce yield losses from salinity. This depends on the experience of farmers. The average-aged farmers who maybe grew up in the past period are very attentive to their fields. They irrigate too much because it is dependent on the quality of the distribution of water on the field. That is why in my opinion it is necessary to distribute their experience and find these farmers and include them in new projects and involve them in introducing to young farmers, because with a lot of the young generation and inexperienced farmers, this problem will increase. It is needed to do training and demonstration good technology for farmers.

We have few NGOs in our country, which try to do something needed by farmers also; usually they do consulting surveys. Thank you.

**Chairman:** Yes, please.

**Dr. Md Syedul Islam, Director General, Bangladesh Rice Research Institute:** Thank you Dr. Shirokova for your nice presentation. I know that Uzbekistan is not open to the sea. It is a landlocked country. You also explained that the cotton and winter wheat crops have some inherent salts tolerating ability. To what extent can it tolerate? How much salinity can it tolerate?

The other question is how the salt is coming. Because in Bangladesh the salt is coming from the sea, so what is the source of salt coming to the soil surface?

These are the two things I want to know, thank you.

**Dr. Shirokova:** Historically, maybe it was the bottom of the ocean. A lot of salt is in the deep layers of our soils, parent rocks. It is a pre-mountain zone, but when we started irrigating big territories (massives) of lands, our groundwater went up and together with that salt went up. In some places this salinization process repeats every season, because salty groundwater stays close to the surface and rises on very thin capillaries of the soil and evaporates and the salt stays in the top soil.

We have desert. If you have desert you know that lands of desert's as usually salty. Now is a desert area near Aral Sea. For improvement environmental situation, a lot of international organizations do forestry of this area. We have a specific salt tolerant plant on this. A lot of money is now being spent for this, to improve the situation.

Except of this in irrigated lands we did some maybe not good solution in the past: we used a lot of vertical drainage, which some time involves the salts from deep horizon to surface. Now our government, when we started to restore these hills, we determined whether this is useful or not useful. It was a very big intervention to develop new land. It was a lot of good or average solutions.

We can conclude that we have salinity of land: natural and anthropogenic, scientists have called it—primary and secondary salinization.

**Chairman:** Thank you very much.

You may have more questions and comments but time is already running out, so I would like to close this session. In this session we have learned a lot of things that are not happening in Japan, and the presentations have reminded us that drought and salinity are very important problems to reduce the resilience in upland production. So finally I thank the speakers for your contribution, and the floor for your suggestions and comments. Thank you very much.