

## **RICE SELF-SUFFICIENCY ON A SILVER PLATTER**

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On behalf of the thousands of SRI farmers in the Philippines, I would like to thank the organizers of the 13<sup>th</sup> National Organic Agriculture Congress and to greet NOAC participants from all over the country. I would like to share with you the experiences of SRI Pilipinas in promoting the system of rice intensification (SRI) in the Philippines.

Why do I say “on a silver platter”? Because for more than a decade now, we have been offering the government a guaranteed method of raising rice yields by at least 20% and attaining rice self-sufficiency. To take an example, SRI was introduced in Cambodia in 2002 by the NGO CEDAC, which was headed by agriculturist Yang Saing Koma. In 2005, the Cambodian government officially endorsed the method. By 2008, Cambodia had more than *doubled* its national rice production. Do not take my word for it. Read the 2012 Ramon Magsaysay Award to Dr. Koma. The RM award said:

*“The linchpin of CEDAC's success was its introduction of the System of Rice Intensification (SRI), an ecologically sustainable approach to rice production. SRI is based on a simple system of plant, water, and soil management, and is suitable to Cambodia's dominant pattern of smallholder farms. Koma introduced SRI in 2000 to twenty-eight reluctant farmers; since then, he has painstakingly promoted SRI so that it gradually spread to more than 100,000 rice farmers, registering a 61 percent increase in rice yields, even as it decreased the amount of seeds and chemical fertilizers used while increasing the use of organic fertilizers by 85 percent. In 2005, the Cambodian government officially endorsed SRI as a rice production strategy. Today, CEDAC is supporting 140,000 farmer families in twenty-one provinces. Between 2002 and 2010, Cambodia's rice production rose from 3.82 million tons to 7.97 million tons, and CEDAC's work has been credited as the major factor in this increase.”*

SRI was also the method that five Indian farmers used to reach 400 cavans per hectare, breaking the world record in rice production held by Prof. Yuan Long-ping of China. SRI has of course been tried in the Philippines, with very good results, and with very good results too. After proper training, farmers are guaranteed to enjoy at least 20% higher yields, reduced external inputs, and the elimination of toxic chemical use in their farms.

Our non-profit group SRI Pilipinas was set up in 2002, after Prof. Norman Uphoff visited the country and gave a seminar on the method before a small assembly of NGOs and farmers' groups. We have since then been promoting the method among farmers and in the government. We didn't have regular funding at all until 2007. That year, we managed to raise P875,000 (about \$20,000) from the Department of Agriculture (DA) during the term of Secretary Arthur Yap, thanks to the persistent nagging of former DA Undersecretary Ernesto Ordonez. From this fund, we managed to do 50 one-day SRI trainings in 49 provinces. Out of these trainings emerged the national network of SRI Pilipinas. Our next funding was in 2009, to hold a national trainers' conference, to evaluate the results of the earlier nationwide trainings, and to make plans for the future. Since then, we have also received support from Oxfam Great Britain, Caritas Czech, and other humanitarian organizations, conducting one-day trainings on request, each training attended by 20-25 farmers on the average. We have also distributed thousands of our SRI primers as well as SRI videos and our SRI book in Pilipino, *Sipag-Palay*.

### **The slow spread of SRI in the Philippines**

Despite these, SRI has spread slowly in the Philippines. The perceived gatekeepers of rice knowhow, the International Rice Research Institute (IRRI) and the Philippine Rice Research Institute (Philrice), expressed very early on a knee-jerk negative reaction against SRI. Highly negative, even insulting, articles by IRRI scientists about the method were published in scientific journals, while early unsuccessful attempts by Philrice researchers were published in local journals and regularly cited in media. IRRI and Philrice are of course very prestigious institutions. They are the presumed experts in rice, and our agriculturists and policy-makers listen to them. The anti-SRI arguments in these early articles have unfortunately stuck in the minds of many Filipino agriculturists at the national, provincial and lower levels. Whenever we talk to a municipal or a provincial agriculturist, we often hear echoes of IRRI's early attacks and Philrice's early criticisms of SRI. In the national government, we hear things like “you might get your proposal approved, as long as you don't call it SRI”.

IRRI has not published negative SRI pieces for several years now. They must have reevaluated their position and

realized that they reacted too soon, without having done any trials themselves. It must have dawned upon them eventually that the millions of farmers now practicing SRI throughout the world must be seeing something that they haven't. Yet, they have neither retracted those early anti-SRI articles nor apologized for their insulting remarks. So provincial and municipal agriculturists who go back and review old journals still come across these articles, and they still use the old IRRI and Philrice arguments against us.

The anti-SRI bias in the agriculture establishment is so strong that the previous agriculture secretary, Proceso Alcala, although a strong proponent of organic farming, ignored SRI and did practically nothing to promote it despite our repeated requests.

Today, IRRI continues its prideful stance, grudgingly acknowledging that SRI involves some good practices but that it should lead farmers towards IRRI's best management practices for rice. They continue to delude themselves that the IRRI management practices are the "best." If I may be so bold as to suggest: *the best set of rice management practices today is SRI*. Sumant Kumar of Bihar, India proved it, when he exceeded 20 tons/hectare using SRI, a record which was recognized by the State of Bihar and published in the Indian journal *Agriculture Today*. The IRRI management practices can rightfully claim the title of "best" *only* if they break Sumant Kumar's record.

### **Why official results are not as dramatic as farmers' trials**

The SRI trials of IRRI and Philrice have not shown the dramatic results that farmers often get. I offer the following explanation why SRI tends to perform better in farmers' fields compared to research stations:

A minimum set of skills is needed to practice SRI successfully, and it takes time to acquire these skills. Our experience in SRI trials is that roughly one in three farmers will show dramatic results, another one will show a slight change in yield, but nonetheless enjoy lower costs, and the third gets a lower yield and higher costs, for one reason or another. If farmers are willing to learn from their mistakes, the odds get better on the second try, and even more on the third. I have not heard any farmer fail for three consecutive trials. Sooner or later, farmers acquire sufficient knowledge and learn to consistently produce many tillers per rice plant, the obvious mark of the SRI method.

Learning SRI is like learning how to ride a bicycle (or to swim). One must pick up a set of skills. Some researchers doing SRI research do so without the humility of learning the SRI skill set first. They are like researchers evaluating the energy efficiency of a bicycle by test-riding one, without learning how to ride a bicycle first. We have on several occasions asked Philrice to include us in their SRI research so that our farmer-trainers may help them learn SRI better, but no cooperation with Philrice has materialized so far, despite our occasional follow-ups.

Note that unlike the lobbyists that regularly queue up to request audience with the agriculture secretary we are not selling anything, nor are we seeking money from the government. We are asking the DA to allot money for its own SRI program, and we are offering to help them implement this program. As the title says, "rice self-sufficiency on a silver platter".

### **Malasakit**

Unfortunately, I have seen in national government agriculture officials very little of what we call "*malasakit*", of caring deeply. I had assumed that they truly cared deeply for farmers. Given the claims of dramatic yields from SRI, I expected these officials to order their staff to learn everything about this method and initiate field trials immediately. So much material can be found on the Web that a simple Internet search can keep a researcher busy for weeks. For years, in fact, we have been asking the Department of Agriculture to conduct SRI field trials jointly with us, with little concrete response.

Thus, today, we promote SRI in the Philippines against a background of indifference by our department of agriculture and the established rice experts, spiced by their occasional derogatory comments. A researcher in a recent World Bank funded economic study by the Department of Agriculture on Philippine rice self-sufficiency and the impact of ASEAN trade liberalization, for instance, told me that the study did not refer to SRI even once because "they have not come across it." In fact, the World Bank itself had produced a training video on SRI, on which we rely heavily in our promotional efforts.

Let me hasten to note, however, that for two years one national agency, the Agricultural Training Institute,

printed for us our SRI primers; another national agency, the National Irrigation Administration, has invited us several times in the assemblies of irrigators' associations; a third national agency, the Department of Agrarian Reform, has started to sponsor season-long SRI trainings itself using funds from the Asian Development Bank; and a fourth agency, the Bureau of Soils and Water Management, has shown enough interest that its director asked us to train farmers in his hometown. So, we are in fact making inroads into the national government although at a very slow pace, and then in the periphery, rather than the government's central decision-making bodies on rice policy.

### **SRI is spreading from the ground up**

Because of this indifference by the Department of Agriculture's central office, our SRI promotional efforts have been done from below, working upwards.

Initially, our training focused directly on farmers and farmers organizations. But we also tapped local governments at the village level whenever they showed interest in working with us. Then, in 2013, we reached the municipal level, when the municipalities of Mercedes, Camarines Norte (in the Bicol region); Molave, Zamboanga del Sur (in western Mindanao), and Aringay, La Union (in northern Luzon) conducted their own season-long SRI trainings. We made another major breakthrough when the entire province of Davao del Norte (also in Mindanao), through the efforts of its rice program coordinator Edgar Cabrera and its IPM coordinator Marilou Runas, launched province-wide season-long SRI trainings. Since 2016, they have also done similar season-long trainings, but throughout Region 11, which Davao del Norte is part of. We are now working on a second region to follow Region 11's footsteps.

Aside from SRI Pilipinas, other organizations have also been promoting SRI. One of the most successful is the Rice Watch Action Network (RWAN), which includes SRI training as part of its 16-week climate resiliency field school (CRFS) directed at municipalities. Through their efforts, more than 30 municipalities have now conducted official season-long trainings on SRI. And because adaptation to climate change has become a top government priority, more municipalities are queuing up for the trainings. The Pambansang Kilusan ng mga Samahang Magsasaka (PAKISAMA, or National Movement of Farmers' Organizations), also includes SRI in its sustainable agriculture program. Another NGO, PASALI, has been active in parts of Mindanao. Finally, the Philippine Rural Reconstruction Movement – one of the original convenors of SRI Pilipinas – continues to promote SRI among rice farmers that it reaches.

### **The benefits of SRI**

SRI would not have spread at all, much less gotten this far, if we were promoting a method that did not work.

SRI does work, farmer after farmer, season after season. It is a robust method. Plants grown under SRI are resilient to long dry periods, flooding, and typhoons. So far, our batting average has been two out of three. Of the two successes, one involves dramatic yield improvements and reduction in costs that impress everyone, and the other shows cost reductions but little change in yield

In terms of yields, we are very confident in assuring farmers of at least a 20% increase once they have learned SRI properly, as long as no disastrous factors like typhoons, long droughts or pest/disease attacks occur. In trials, yield increases in fact often exceed 20%.

In terms of costs, we can confidently claim the following results: around 70-80% reduction in seed costs; around 40-50% reduction in irrigation costs; and more than 50% reduction in pesticide/herbicide costs.

Most of us at SRI Pilipinas were already organic advocates before we adopted SRI. Thus, we teach SRI the organic way. To us, it is a tool for helping farmers shift from chemical to organic farming.

Fertilizer costs are about the same during the organic conversion process, which can take several seasons. This is because we suggest to farmers that they initially spend all their fertilizer budget on compost materials. This results in a massive application of compost and quickly rehabilitates the soil. But the adopters' fertilizer costs will go down steadily as natural soil fertility and soil organisms return, and as they learn to make their own compost and organic sprays using natural fermentation methods.

Labor costs may go up 20-30% initially (but not always). But it will also go down eventually as farmers learn

and innovate with labor-saving approaches under SRI. At the initial stages of adoption, labor costs are sensitive to local labor practices and payment methods for various transplanting and weeding jobs. Overall, farmers often still spend less on labor under SRI, even at the initial stages of adoption.

But to be convinced to adopt, farmers have to try the method first. The issue among farmers is how do we get them to try. How do we convince them to make that first step of setting aside 100-500 square meters for their first SRI trial?

### **The challenge of convincing farmers**

In our experience, this involves a mix of convincing arguments and minimizing the risk of failure.

To get the farmers' attention, we truly need convincing arguments. We have used the following:

1. Sumant Kumar's as well as Cambodia's experience help to open up farmers' minds about possibilities. We make it clear that farmers should not expect to reach a 20-ton yield themselves, just as no one should expect to win a world boxing championship in eight weight divisions, even if they learn the boxing style of Filipino boxing great Manny Pacquiao, who holds such a world record. But we do assure them of at least 20% higher yields, based on Philippine experience.
2. Pictures of high tillering rice plants also help open up farmers' minds. They usually admit having seen such high number of tillers, but only on rare occasions—certainly not as an average throughout the field. Once they are told that SRI makes 20 or more tillers per plants possible *on the average*, they sit up and start to listen.
3. We then explain to farmers why SRI works. This is something that we learned from experience and from picking the minds of agriculturists who were early supporters of SRI, not from university courses or textbooks.

SRI attains its dramatic yields because it has found the secret of growing lots of productive tillers from a single rice plant. Most conventional farmers report an average of 5 to 15 tillers per plant, more often on the lower side of this range. SRI on the other hand produces 20, 30, 50, and even more productive tillers per plant. Farmers invariably agree, that if they can learn how to grow rice with a consistently high number of productive tillers, they will surely be able to raise their yields.

The key is in knowing when the process of tillering starts. SRI's discoverer, Fr. Henri de Laulanie, a Catholic priest who was also an excellent agriculturist, determined from careful observations that the first tillers emerged at the same time as the rice plant's fourth leaf. He also determined that leaves emerged from typical lowland varieties at a more or less regular interval of 4-5 days, which he called a phyllochron. This meant around 16-20 days after sowing. Although some farmers know this, few apparently make the connection between this vulnerable period and the time of transplanting (18-25 days after sowing). The typical farmer's timing is completely wrong, we tell them, because they uproot their seedlings at around the same time that tillering is about to start or has just started. This disrupts the tillering process, delaying it or aborting it altogether. Thus, the best time to transplant is well before the first tiller starts to form—around the time of emergence of the second leaf, 8-12 days after sowing. When farmers hear this, one can see their faces light up in comprehension, as they see the connection for the first time. After we talk about the terrible treatment that seedlings usually undergo, contributing to the disruption of the tillering process, the farmers clearly *get it*.

4. To justify the wide planting distances (25 cm or wider) we show farmers a picture of four emaciated children sharing a plateful of food, a telling argument against planting clumps of seedlings and in favor of giving each rice plant “its own plate.” Based on this argument, we do not count “two seedlings per hill” as SRI practice. We insist, as Henri de Laulanie also did, that each plant should have its own space, without having to compete for sunlight and nutrients. Competition for food, even within a litter, always results in winners and losers, and at least one runt. And the runt is usually sickly, more vulnerable to pest and disease. In rice too.

5. It will be hard for a rice plant to grow many tillers if it has few roots. And the secret of dense, deep roots is for the rice plant to experience occasional dry periods. Dryness will make the rice plant search for water by sending out more roots. If the dry period is somewhat prolonged, a moisture gradient will establish itself in the soil (drier nearer the surface, wetter as you go deeper). Since all roots grow towards the water, the prolonged dryness will make them grow deeper, towards greater moisture.

We have developed similar down-to-earth arguments for each SRI practice, which farmers quickly understand,

leading them towards a decision to try SRI, to see for themselves.

At this point, once farmers are willing to try, we also need to curb their enthusiasm. Some want to try it immediately in one hectare. We dissuade them. In our approach, we give importance to maximizing the probability of success on first try. This is a priority for us.

Thus, we recommend that a first trial should be done on 100-500 square meters first. We explain that it is like learning how to swim. You should not jump immediately into the deep ocean in your first attempt to learn how to swim. Most of SRI failures in the Philippines are due to farmers doing it on one-half or one hectare. on their first try. Even those who did succeed would have had a much better chance of success (and a less worrisome growing season too), if they had started on a smaller scale.

### **Raising the chances of success on first try**

With our approach, we get a “two out of three” success rate and one dramatic result in three trials at this time. We continually ask ourselves what else can be done to improve the chances of “success on first try” (SOFT). Here are a few more measures we advocate to stack the probabilities in our favor:

1. Do as many of the SRI practices as possible. Do not leave out the early transplanting, single seedling per hill, alternate wetting and drying, and the weeding. SRI's dramatic results come from the synergy between its practices.
2. Instead of trying it alone, convince other neighbors to do trials too. The more trials, the greater the chances that several will show dramatic results. A single trial has 33% chances of a dramatic result. Two trials raise the chances to 56%. Three trials to 70%; five trials to 87%; ten trials to 98%. Our trials usually involve 20 or more farmers. If they all had a 100-500 sqm trial plot, the chances of at least one dramatic success among 20 trials is practically 100% (99.97%), the chances of at least two dramatic results, 99.7%; of at least three dramatic results, 98.2%; of at least four, 94%; of at least five, 85%. This is also the reason why we avoid a single demonstration plot for 20-30 trainees, which is in effect a single trial only, with a 33% chance of showing dramatic results. We insist that each trainee in our season-long trainings, set up their own 100 to 500-square meter trial plot.

These probabilities of course assume that the trials are independent. This assumption breaks down for weather events and major disease or pest outbreaks.

3. In their first trial, farmers should put as much compost as they can afford. We normally suggest one 50-kg bag per 100 square meters of trial plot, applied at the land preparation stage. (It can be less subsequently, especially when doing SRI on a large-scale.)
4. Instead of using only one variety, divide the trial plot into several sections and use different varieties for each. Often, some varieties respond to SRI treatment better than other varieties.
5. Do not let the weeds gain momentum. Failure to control weeds is another common source of failure.

In the SRI Pilipinas network, we continue to fine-tune these guidelines, so that we may keep raising the chances that our new adopters, even if they are trying SRI with only our primer as their guide, can succeed on their first try.

### **Promoting SRI from below**

Unable to get full government support, we have persisted in promoting SRI by starting from the bottom, going up`.

Let me explain in more detail this bottom-up approach of SRI Pilipinas.

From our government-funded trainings in 2007-2008, we built a core network of more than a dozen farmer-trainers spread throughout the Philippines. Based on this core, we publicly announced our commitment to give a one-day training to any group of 20 or more farmers, anywhere in the Philippines, who request SRI training. Thus, when we get requests for training, the trainer usually comes from the same, or a nearby region, reducing our travel costs. We only do one-day trainings, to stretch our funds. Internally, we have a continuing debate between one-day trainings and the more expensive but more effective season-long trainings. So far, we only do

season-long trainings if a local government or another NGO is willing to shoulder a larger part of the cost.

Aside from our own one-day trainings and the season-long trainings done together with local governments or other NGOs, we also do long-distance one-on-one trainings. Our platform for doing this is the SRI Hotline, three mobile phones connected to a netbook, through which we communicate by text/SMS with all contacts. We announce the mobile phone numbers in radio interviews, during news coverage, and in magazine articles we write ourselves. For a year, we even advertised the number in a nationally-distributed local-language tabloid, inviting readers to text us their name and address, to receive a free SRI primer, which we send via postal mail.

Since our postal system is not very efficient, we have also reformulated the printed primer into 45 batches of text lessons, in the local language, of course. One batch, consists of 6-15 text messages, explaining a specific topic. The 45 topics of text-based lessons cover not only SRI but related topics like making organic fertilizers and sprays, composting, vermiculture, and so on. The modules are sent once (sometimes twice) a day, over a period of around 45 days. Within this period, the printed SRI primer would have hopefully arrived from the post office, supplementing the text lessons with pictures.

Although we have been doing this SMS-based distance education with farmers for a long time, our first experience doing it in cooperation with the government occurred during the second cropping season last year, when SRI Pilipinas and the City of Antipolo, Rizal (site of the famous Hinulugang Taktak waterfalls) and less than an hour east of Manila, ran a 45-day SMS-based SRI training for Antipolo farmers.

We have also managed to get access to a radio program. Every Saturday from 4am to 6am, two of our SRI trainers host a radio program on organic farming, half of which is devoted to vegetables, and the other half exclusively to SRI. The DZEC early morning radio program regularly announces our training offers, and has been a consistent source of recruits for SRI trials. As far as we know, this is the only radio program in the country that specifically covers SRI regularly.

At the end of the lessons, we encourage the farmer to do a 100- to 500-square meter SRI trial. At the end of the trial, if farmers decide to use SRI again in the next season, we send them a copy of our SRI book. Many of our farmers learned SRI this way, rather than through face-to-face trainings. Those who do not try (they may just have been curious non-farmers), can still help us, if they agree to distribute our SRI primer. Then we send them a dozen copies by courier, which turns out to be cheaper than postal mail. We currently have more than 5,000 contacts registered on the SRI Hotline. Because we already have their numbers, we can send them updates, news, and other materials. Our core network still relies on face-to-face meetings and workshops, but a significant portion of our expansion is due to these long-distance SMS-based contacts.

Through these face-to-face and long-distance trainings, we have gradually spread news and knowledge about SRI. Through our contacts and adopters, we have reached into village councils and subsequently municipal governments. This is how we made connections with our SRI champions in government who initiated municipal-level season-long trainings and, later, province-wide trainings season-long trainings. The following details will give an idea of the extent of our ground work.

Of the 81 provinces in the Philippines, we have at least one contact in every province. There are:

7 provinces with at least one contact in every town (100% coverage):

Metro Mla (counting it as a province), Aurora, Bataan, Zambales, Nueva Ecija, Bulacan, Tarlac

3 provinces with one town remaining unreached:

Marinduque, Rizal, Oriental Mindoro

6 provinces with two towns remaining unreached:

Laguna, Davao Del Norte, Pampanga, Pangasinan, Aklan, Occidental Mindoro

65 provinces with three or more towns remaining unreached:

Of the 1,633 towns (cities or municipalities) in the Philippines, 872 towns (53.4%) have at least one Hotline contact, while 761 towns (46.6%) have no Hotline contacts.

Of the 872 towns where we have contacts,

378 have 4 or more Hotline contacts.

105 have exactly 3 Hotline contacts.

175 have exactly 2 Hotline contacts.

214 have exactly 1 Hotline contact.

Note how we define contacts: individuals who have requested the SRI primer through SMS (thus, we have their phone numbers for further contact) and have given us their full name and address (thus, we can send them more printed materials). Through these contacts, we have a foothold in their area for further extending our reach.

That is the SRI Pilipinas experience: from the ground, up. Today, knowledge of SRI is diffusing – almost invisibly, slowly but surely – in all provinces of the country. With this bottom-up approach, we are certain that we will eventually reach every rice farmer too, faster with government support, more slowly without it.

### **Needed: SRI champions in government**

Even with practically no support from the Department of Agriculture's policy makers, SRI is spreading at the grassroots level slowly but surely, a few farmers at a time.

Too slowly, however. We need the government to join the effort. We have realized that the key to mainstreaming SRI in government is to find champions within government. We need government champions who will stick their necks out and push for the promotion of SRI, against the objections of nay-sayers, of which there are many inside the government. Without these champions, a strong objection – or even a casual negative comment – from one contrarian is enough to delay decision or kill a pro-SRI proposal. An SRI champion will respond to the objector and debate with him, present all the supporting evidence, and convince other committee members to approve a proposal. A champion will not stop but will find ways within the byzantine government bureaucracy to get an SRI project approved, funded and implemented. Gradually, we are drawing such champions from inside the government into our network.

For the record, our earliest champion in government was the director of Agricultural Training Institute (ATI), the late Atty. Edwin Acoba. It was he who urged all ATI researchers to try SRI. Only one of them, Noe Ysulat of ATI Region 12 (Central Mindanao), responded to Atty. Acoba's call and started his SRI research in 2000, with spectacular results. There are more SRI champions in government now, but not as many as we would want. Still, we already have enough government champions to feel confident that SRI will be spreading more rapidly in the Philippines in the future. One of our colleagues in this conference, is retired regional director Adelberto Baniqued of the Department of Agrarian Reform in western Mindanao. Although he learned about SRI and adopted it only after retirement, having turned into a farmer himself, he has enough government contacts and seniority to wield significant influence within the government. Another colleague here, Dr. Carmelita Cervantes, heads the extension work of a regional government university for agriculture, the Central Bicol State University for Agriculture, and has played a key role in her region in promoting SRI within the government.

Under the Duterte administration, SRI Pilipinas hopes to identify more champions in government, so that in the next six years of this administration, the government may mobilize significant funds and other resources for nationwide SRI promotion.

Dear friends in the organic rice movement, if you have not tried SRI, I hope you will as soon as you get back to your farm. You will be pleasantly surprised at the results. To those municipal and provincial agriculturists as well as local executives whose curiosity I have managed to arouse, SRI Pilipinas will be glad to enter into a memorandum of agreement with you to help you conduct season-long trainings in your locality, so that your farmer-constituents may benefit from this amazing method. To national government officials, you do not have to take my word for it. Go tell your staff to research the system of rice intensification. The best site is the SRI website maintained by Cornell University.

I am encouraged by the new administration's promise that “change is coming”. If the national government officially promotes SRI, like Cambodia did, Filipino rice farmers can certainly look forward to better yields, lower costs, the phase out of toxic chemicals, and a better life in general.

Thank you very much

[This paper was presented by the author at the 13<sup>th</sup> National Organic Agriculture Congress (NOAC) held on November 23-25, 2016 in the province of Ilocos Norte.]