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<th>Title</th>
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</tr>
</thead>
<tbody>
<tr>
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<td>Nakasone, Henry Y.</td>
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<td>冲縄農業研究会</td>
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沖縄農業 研究会
FOUR BASIC FACTORS TO BE CONSIDERED FOR THE IMPROVEMENT OF RYUKYUAN AGRICULTURE

by

Henry Y. Nakasone
Michigan State University Group, University of the Ryukyus

When one is asked to write about his impressions of an area, he is inclined to overextend himself and tread on unfamiliar grounds. This will quite often lead to embarrassing statements. To keep these pitfalls to a minimum, the writer will confine this article to agriculture, the area of his greatest competence by virtue of training.

Many surveys have been made to the present and much is being said about the Ryukyuan agriculture, all in good faith and directed towards its development to higher levels. The writer has now had the opportunity to observe and to study the horticultural situation in the Ryukyus for a total period of approximately twelve months. During this period, critical surveys were made throughout Okinawa and several islands of the Sakishima group; lectures and discussions on various aspects of horticulture were held with farmers, technicians and officials; reports of previous survey teams were studied and discussions were carried out with members of other survey teams who happened to be on the scene during the same periods. From these studies and discussions an attempt has been made to select factors which may be considered basic to the progress of agriculture in the Ryukyus.

In final analysis there are only a few basic factors which must be considered and acted upon in order to accelerate the progress of this industry.

1. The first and perhaps the most important basic factor seems to lie in the area of education and the general attitude of the agricultural people. Educational process is a slow one but great strides have been made in the area of farmer education in the Ryukyus during the past decade. However, much remains to be accomplished. The level must be reached wherein farmers themselves will be able to evaluate new concepts and practices and put them into effect. The lack of basic education, adherence to traditions and conservatism among the older farmers have been the deterrents to rapid progress. This has been a universal problem and not peculiar to the Ryukyus. In the last decade, the balance has been shifting from the old farmers to their children who have grown and matured in a rapidly changing society with increasing opportunities for education. Unfortunately, this desired shift is hampered by the movement of young people from the farms to the city. With higher education the farmer's attitude will be expected to change, thus increasing his appreciation and understanding of advanced technology and the will to put them into practice. Having the farmer accept ideas is an important accomplishment but an even greater step forward is to have the farmer practice the accepted ideas.

Modern agriculture has developed into a highly scientific industry. Its competitive aspects in many instances are not confined to localized areas but are global in scope. The price of sugar or pineapple is considered in terms of world markets, affecting every producing area throughout the tropical and subtropical world. To participate in this world competition, every available scientific knowledge must be understood and employed. A population who fails to understand this and refuses to accept and practice improved technology is doomed to lose in the stiff global competition.
To develop a high degree of responsive attitude among the farming population, there must also exist productive research centers. Research centers, to be productive, must be staffed with highly trained personnel who can produce results and demonstrate to farmers the values of these results. They must earn the respect and confidence of the farmers. This again follows educational pathways. Educational needs are not confined to farmers alone but must extend upwards to the researchers, extension agents and government officials who are entrusted with the responsibility of agricultural development. While the entire process is now going on in the Ryukyus today, it can be accelerated through the will and determination of the people themselves.

2. The second factor is the consideration of crop protection. Everyone must realize and accept the fact that no crop can attain a desirable degree of success in the Ryukyus without some form of protection from the typhoons. Even if one were to assume that man is not able to cope successfully with winds of typhoon velocity by any of the known means, there is still the consideration of the 15 to 20 knot winds that blow frequently during the winter months. Much of the crop damages that occur during these months are not attributable to low temperatures alone but to the dessicating effects of these winter winds. In most instances crops growing immediately to the lee of windbreaks or other protective devices escape the kind of damages inflicted upon the same crops growing in exposed areas. Evidences showing these differences are rather common during the winter months.

Coming back to the winds of typhoon intensity, the two arguments most frequently given are: (a) there is no windbreak that can be constructed within the financial means of the farmer which can adequately protect the crops, and (b) the farmer cannot afford to relinquish the space taken up by windbreaks. On the surface these arguments appear to be legitimate and sound. One must admit that windbreaks cannot give one hundred percent protection to all crops and that the average Ryukyuan farmer tills a small parcel of land which he can ill-afford to waste. However, a close study of these conditions out in the field has revealed evidences which refute the two arguments presented above.

In considering the first argument, that of windbreaks being inadequate to protect crops against winds of typhoon velocity, evidence of one hundred percent protection has been observed by the writer. Some chrysanthemum growers in the Yogi area use tightly woven bamboo fences around the flower beds. During typhoons, similar material is placed over the beds so that the entire bed is enclosed within this protective frame. By this means, beds of chrysanthemum approximately a meter high and just initiating flower buds were saved without damage to a single leaf. Figure 1 shows this protective structure and the chrysanthemum saved during Typhoon Emma in November of 1959. This system of protection is relatively inexpensive and applicable to other flower and vegetable crops. The case in point only proves the functionality of the old adage, "where there is a will, there is a way".

To obtain one hundred percent protection for tree crops is a difficult one and such a degree of protection is not expected, although desirable. However, proper types of windbreaks can lessen the severity of damages, thus reducing mortality and increasing the rate of recovery of the trees. Trees planted in exposed areas without benefit of windbreaks are so severely damaged that many die without recovering. Surviving ones recover slowly and are usually too weak to produce satisfactory crop. There are evidences showing good growth and high yields of trees protected by windbreaks. Figure 2 shows one of several lychee trees more than
Nakasone : Four basic factors for the improvement of Ryukyuan Agriculture

twenty five years old, growing within Fukugi (*Garcinia spicata*) windbreaks on the Yamashiro farm, Sakiyama, Nakigin Son. The lychee branches are very brittle and would not have developed into such beautiful trees without protection.

A well-established Fukugi windbreak bordering a sugar cane field is shown in Figure 3. These tree windbreaks are well within the farmer’s financial means.

The second argument, the lack of space for windbreaks, appears to be contrary to sound economic reasoning. Admittedly, some land will be tied up and the total productive area is reduced, but the farmers who have windbreaks and experienced technicians agree that better growth and increased yields obtained from protected plots more than justify the reduction in acreage. Without windbreaks about sixty to a hundred percent loss may be incurred, but with proper protective measures, fifty to eighty percent may be saved. Further increase in yields may be realized by improvements in other cultural practices and by planting improved varieties. A large number of improved varieties of crops have been introduced into the Ryukus up to now but because of the lack of windbreaks, their genetic potentials have not been fully demonstrated. No matter how good a genetic potential a plant possesses, it must first be given the chance to grow before its desirable traits can be manifested. This has been difficult to accomplish here. In fact, the real potential of many local crops has not been determined due to the lack of windbreaks and deficiencies in other cultural practices. Therefore, with the establishment of windbreaks throughout the islands, other improved cultural practices will show their effectiveness upon plant growth and yields.

The windbreak planting program of the Government of the Ryukus is beginning to show its effects. Governmental agencies responsible for this program have done a commendable job to date within the limits of their facilities. However, much remains to be done especially in convincing the farmer that the protection of his farm is largely his responsibility. Seeds of the Fukugi (*Garcinia spicata*) and seeds or seedlings of the Isu (*Distylium racemosum*) are easily available, especially in Northern Okinawa. While a large quantity of Mokumau (*Casuarina equisetifolia*) have been distributed to farmers for windbreak purposes, research in windbreak planting schemes, effectiveness of different types of windbreaks (windbreaks other than trees), effective range of windbreaks and other similar problems would be highly desirable. In connection with the problem on the effective range of windbreaks relative to its height, the writer was taught that as a general rule, the effective range is approximately seven times the height of the windbreak. To determine the actual range of effectiveness, he made some studies immediately after a rather mild typhoon in November 1962. Effective range of hibiscus hedge approximately eight feet high and similar types of windbreaks was found to be no more than 1.5 times the height.

3. The third basic factor lies in the area of applied research. There is an urgent need to increase the output of research which are directly applicable to the farm. The farmer is faced with many problems, most of which could be resolved by simple experiments. A good example is the study of the effective range of windbreaks. It is not one that could be labelled a sophisticated research, bringing fame to the researcher, but the solution is valuable and necessary to establish distances between windbreaks for maximum effectiveness in a more scientific manner. Thus, no matter how elementary the experiments might seem, if the results are going to improve the farmer’s situation, then they should be done.
At the present level of agriculture in the Ryukyus, fundamental or basic research should be secondary to applied research. Approximately 80 to 90 percent of the research efforts and money should go to the area of applied research. With advances in the economic levels of the farmers, applied research may be reduced in favor of the more basic types of research. This appears to be a logical approach to the immediate needs of the economy of any area.

4. The fourth and last factor concerns the dissemination of research results and information to the farmers. All efforts and money put into research will be wasted if the results are not disseminated to the people concerned. While most researchers prefer to publish their results in technical language understood mostly by their colleagues, institutions are responsible for the dissemination of such technical information in simpler forms to the farmers. This is an important aspect of farmer education. The writer has seen numerous cases in the Ryukyus wherein experimental information (from local or foreign source) has not even filtered down to the Son agricultural agents. Noticeable improvements have taken place, but the rate of dissemination must increase in order to meet the requirements of the first basic factor mentioned at the beginning.

In summary the four basic factors which are considered to be the most important for consideration in the Ryukyus in order to accelerate the rate of progress of agriculture are, 1 Education of farmer and technicians, 2 crop protection, 3 applied research and 4 dissemination of information. There are many other important factors, but these will fall into their rightful places as the four primary factors are improved. There is a great potential in its agriculture inspite of the typhoons. This potential can be developed by improving the factors mentioned by cooperative efforts within and among institutions such as the experiment stations, University, Government, agricultural agents and the farmers. Each has its own responsibility to perform and to contribute to the total picture of agricultural development.

Figure 1 Beds of chrysanthemum plants protected by tightly woven Bamboo fences. During typhoons, the tops of the beds are also covered tightly with the same material.

Figure 2 Well-grown lychee tree on the Yamashiro Farm, Nakijin. The entire area is enclosed with Fukugi windbreak.

Figure 3 A well-established Fukugi windbreak bordering a sugar cane field. This is also found in Nakijin.