
PALAWIJA

NEWS



The CGPRT Centre Newsletter

Volume 18, Number 3

September 2001

Stabilization of Upland Agriculture in El Nino Vulnerable Countries: Country Report of Malaysia

*Ariffin bin Tawang; Tengku Ariff bin Tengku Ahmad; and Mohd.
Yusof bin Abdullah*

Summary

For the past few decades, the agricultural sector as a whole has been fairly stable, which has influenced the economic stability of many nations. Translated at the farm level, this has led to a fairly stable and predictable income of the farm community at large. However, for the last twenty years, the incidence of abnormal weather variation has been more frequent and rampant, brought up predominantly by El Nino. In Malaysia, the El Nino induced weather change has resulted in a prolonged dry season, which has led to severe drought and increased temperatures. This was further compounded by the formation of haze due to the large scale burning of forest and plantations for land preparation. These phenomena brought serious implications on farm productivity and land use patterns. This study aims to describe, analyze and quantify the impact of El Nino induced climate variability on the agricultural sector and rural economy, and to propose measures to mitigate the

impact so as to stabilize agricultural production and the welfare of the rural population at large.

Malaysia possesses a typical tropical climate, where the temperature and humidity are high and fairly uniform, with abundant rainfall, good cloud cover all the year round, and small seasonal variation in solar radiation. However, the recent El Nino resulted in acute rainfall deficit, fewer rainy days and increased daily temperature. Air quality, measured in terms of Total Suspended Particulates (TSP) also increased dramatically. For all regions in the country, the last El Nino episode resulted in rainfall deficit ranging between 5% and 26%, an increase in temperature between 0.5 °C and 1.7 °C, and TSP readings increased by 1.6 to 3.5 fold.

Weather plays a major role in determining crop yields, including the year to year variability and the spatial patterns of global agriculture. Environmental stresses such as drought, high temperature, and air pollution are major limiting

IN THIS ISSUE

<i>Stabilization of Upland Agriculture in El Nino Vulnerable Countries: Country Report of Malaysia</i> <i>Ariffin bin Tawang; Tengku Ariff bin Tengku Ahmad; and Mohd. Yusof bin Abdullah</i>	1
<i>Message from the Director</i>	3
<i>Commercialization is a Key to the Development of CGPRT Crops in Asia</i> <i>Budiman Hutabarat</i>	7
<i>CGPRT Centre News and Activities</i>	11
<i>Announcements</i>	14

* Economic and Technology Management Research Centre, MARDI, Kuala Lumpur, Malaysia. This paper is taken from Stabilization of Upland Agriculture in El Nino Vulnerable Countries: Country Report of Malaysia, Working Paper No. 61, CGPRT Centre, Bogor.

factors to crop productivity in the tropics. The impact of these climatic stresses on crop productivity, evaluated using morphological, physio-biochemical and yield responses, indicated that climate variability does affect the agricultural sector in Malaysia. Subsequently, this will be a threat to national food security and the economic contribution from the agricultural sector.

The main environmental variables for crop growth are rainfall, temperature, solar radiation and atmospheric gases, particularly carbon dioxide and oxygen. Any change in these factors would have a significant impact on productivity and land use patterns. Under dryland conditions two types of stresses are commonly encountered, namely water stress and high temperature stress. The effects of high temperature stress are often confounded with those of water stress, because drought is usually accompanied by high temperature, which increases the rate of transpiration and hastens the occurrence of injurious dehydration.

Lack of water influences crop growth in many ways. The effect depends on the severity, duration, and time of stress in relation to phenological stages of growth. Generally, most crops grow well with a mean annual precipitation greater than 2000 mm and a minimum monthly rainfall of about 150 mm. Crop productivity decreases linearly with a decrease in rainfall and is severely affected when mean annual precipitation falls below 1000 mm. This precipitation requirement is true for many important plantation crops such as oil palm, rubber, cocoa and other annuals such as rice and vegetables. Nearly all annuals, particularly vegetable crops, are sensitive to drought during two periods: flowering and fruit development (tuber formation or head formation). Depending on the vegetable type, this period may extend from 3 to 10 weeks. In perennials, such as oil palm, monthly yield depends on climatic conditions 2 to 2.5 years before harvest and the effect of prolonged drought on fruit trees can result in reduced yields for several years. On the other hand, some perennials e.g. mango, durian and mangosteen will not flower properly unless they have been through a period of water stress.

Apart from water and temperature, solar radiation is also an important factor in agricultural production. It controls photosynthesis and has a strong effect on many other biological processes. Photosynthesis and transpiration are two

physiological processes that increase almost in proportion to the intensity of solar energy. In general, most tropical crops require the optimum amount of sunshine of about 3-4 hours and yield is not usually affected if the intercepted radiation is more than one-third of the full solar energy. Relatively high solar radiation during the reproductive stage has remarkable effects on increasing yield in rice, oil palm and fruit trees. However, a reduction of 40 to 70% in intercepted radiation as the result of air pollutants or with the occurrence of haze may to a certain extent affect crop productivity. The reduction in fresh fruit bunch yield and lower extraction rate for oil palm are presumably due to haze that occurred within the previous three months.

Quantification of the impacts of the El Nino on the performance of specific commodities and the subsequent social and economic impacts was a difficult task. This was due to the difficulty in isolating the 'El Nino-related effects' from other effects. Since yield was the sole basic criteria to evaluate crop performance and output, the evaluation can be biased due to the effects of other variables, which could be more significant. These include a number of other variables that could affect biological yield over time such as technical change, input use and better crop management practices. It is also possible that non-weather related variables such as economic factors also affect yield performance. To reduce the bias for technical change, losses due to weather changes for each respective year were calculated based on a five-year interval moving maximum. A major assumption here was that no technical change takes place within the five-year interval. For the major crops such as oil palm, rubber and rice, this analysis was followed by a simple "yield function regression analysis", where the significant variables that affect crop performance were identified.

The analyses carried out provided strong evidence of the negative effects of the El Nino on Malaysian agriculture. Total losses to agriculture as a result of poorer performance of oil palm (Table 1), rubber (Table 2) and rice (Table 3) due to the El Nino were estimated to be more than RM 3.4 billion for the 1980 to 1999 period. Hardest hit was the palm oil industry with estimated losses of RM 2,839 million, followed by rubber with about RM 357 million and rice with almost RM 218 million. These

Message from the Director

Dr. Haruo Inagaki completed his term as Director of the CGPRT Centre as of June 30, 2001, and I succeeded him from July 1.

On behalf of the CGPRT Centre and of myself, personally, I would like to sincerely thank Dr. Inagaki for his dedication during his tenure. Owing to his efforts, the Centre has been able to accomplish its duties with great success under a very difficult financial situation, which the Centre has experienced for a long time. We also need to continue to do our utmost in accomplishing the mandate of the Centre, i.e. to contribute to rural development and poverty alleviation in the region.

During the past three to four decades, production and consumption of rice increased tremendously in Asia and the Pacific region due to technical and institutional developments, known as the Green Revolution. Rice is now meeting demand as a staple food of millions of urban and rural people in the region. As a result, consumption patterns of the CGPRT crops have

been changing dramatically. Cassava, for example, is now used as feed, raw material for processed foods and in industrial applications, etc. in addition to the traditional use of fresh root for direct human consumption.

This indicates new marketing opportunities for the CGPRT crops. The CGPRT crops are still very important components of upland farming systems, in particular, in marginal areas, where unfavorable natural and socio-economic conditions prevail and these crops are the only alternatives that poor farmers can adopt in their farming systems.

Therefore, it is very relevant and urgent for us to seek and provide avenues for CGPRT farmers to participate in and benefit from these new opportunities. We need to identify and address the technical and socio-economic constraints to these new opportunities. I do hope that the Centre will be able to contribute to rural development and poverty alleviation in the region through our activities.

NOBUYOSHI MAENO

estimated losses do not take into account the secondary spin-off losses resulting from loss of production value of other downstream and derivative products of palm oil, rubber and rice. Results from the regression analyses also indicate that the El Nino episodes significantly affected yield. Results also show that rainfall and total suspended particulate were important variables that affected yields of oil palm and rice. The analyses for the other sub-sectors including fruits, vegetables, sugarcane, fisheries and selected livestock industries, showed no evidence that El Nino had resulted in significant productivity losses.

The country also incurred loss in terms of foreign exchange as a result of the loss from potential export earnings of palm oil and the need to import more rice to fulfill the country's demand. Based on the fact that about 75% of Malaysia's production of palm oil in 1998 was exported, the total loss in exports in the EY was estimated at RM 2,129 million. For rubber foreign exchange losses were estimated at RM 179 million.

The importance of mitigating measures was given special consideration in the report. In fact, the marginal impact of climate on agricultural production could be due to the various mitigating measures already in place. For one, the country was not caught unprepared, at least for the El Nino of 1997/98. Ample warnings and forecasts were provided by the Department of the Environment based on their continuous monitoring of weather patterns. The presence of an adequate and efficient supply of irrigated water, especially during the planting and growing period, increased irrigation efficiency with the introduction of drip irrigation, water recycling, water harvesting and other water conservation strategy helped in mitigating the possible repercussions of water stress on crops, especially among the annual crops. Other measures include the introduction of a more stringent measure by the government, such as the amendment of the Air Quality Index (1974), to provide stricter regulation and stiffer penalties to ensure maintenance of air quality. In the plantation

sector, the 'zero burning policy' was introduced, supported by intensive aerial and land surveillance. Since the haze incidence was the consequence of transboundary movement of pollutants, the ASEAN Regional Haze Action Plan was introduced to complement and support the National Haze Action Plan.

In a longer-term strategy, the existing national capability for monitoring the development and evolution of El Nino must be strengthened. It is pertinent that the increased capacity to predict climate variability, and subsequently establish the relationship between climatic parameters and crop yields in the form of expert systems, would help in establishing the necessary tools for prediction and subsequent development of mitigating measures. This would facilitate decision-making processes at different levels. Such approaches could provide a dependable early warning system, which should be able to advise farmers on what crops to grow, where and how much to meet the impending change in weather. However, this would require better access to technical and financial resources for the relevant authorities. Similarly, research and development support in the areas of water saving technology, drought resistant varieties,

development of expert systems and precision farming need to be strengthened. These must go hand in hand with other supportive policy and legislation, public awareness and education. Obviously, irrigation is the most important tool to counter the effect of drought. Therefore at the farm level, the existing water supply infrastructure must be efficiently designed, operated and maintained so as to reduce any wastage. Introduction of a water pricing policy could be considered to reduce water wastage during farm operation. The concept of crop insurance and other financial strategies, which have not been exploited yet in this country, should be given serious consideration to ensure the ability of farmers to weather droughts and subsequent crop failures.

Whilst drought is a natural phenomena that can not be altered, haze is basically man made and could be handled. The existing mechanisms in place, in terms of monitoring, legal and institutional arrangements and stronger regional cooperation, would only be meaningful if there were strong partnerships, commitments and the capability of enforcement. Apparently, these are among the weak links. This must be strengthened, and acted upon diligently.

Table 1 Estimated Net loss for oil palm sector due to El Nino.

Year	Estimated Net % loss	Production ('000 tons)	Estimated Production Without El Nino ('000 tons)	Difference ('000 tons)	Price/ton (RM/ton)	Loss (RM million)
1982	3.01	3,510.92	3,616.60	105.68	829.0	87.61
1983	14.61	3,016.48	3,457.19	440.71	991.0	436.74
1991	4.13	6,141.35	6,394.99	253.64	836.5	212.17
1998	10.63	8,319.68	9,204.06	884.38	2,377.5	2,102.61
Total net loss						2,839.13

Table 2 Estimated net loss of the rubber sector due to El Nino.

Year	Estimated Net % Loss	Production ('000 tons)	Estimated Production Without El Nino ('000 tons)	Difference ('000 tons)	Price (RM/ton)	Loss (RM million)
1981	1.18	1,452.00	1,469.13	17.13	1,400	23.98
1982	1.53	1,440.93	1,462.98	22.05	1,400	30.87
1990	15.95	1,352.00	1,567.64	215.64	1,400	301.90
Total net loss						356.75

Table 3 Estimated net loss of rice due to El Nino.

Year	Estimated Net % Loss	Production ('000 tons)	Estimated Production Without El Nino ('000 tons)	Difference ('000 tons)	Price (RM/ton)	Loss (RM million)
1981	4.0	1,748.77	1,818.72	69.95	511.85	35.80
1980	1.8	1,884.98	1,918.91	33.92	660.00	22.38
1998	5.66	1,994.24	2,107.11	112.87	1,413.85	159.58
Total net loss						217.76

Drought related impacts

The existing literature on economic losses brought about solely by drought in this country are rather limited. This is especially so with regards to the economic losses incurred by the agricultural sector. There are several possible reasons for this.

Firstly, the drought prone areas in the country are rather limited. The northwest region is the only region in the country where there are distinct dry seasons lasting two to four months in a year. This condition has been fully exploited for the production of mango and sugarcane, which require such climatic conditions. Paddy, which is also important in the region, is planted within the MADA irrigation scheme, which in 'normal' years will not have a problem in providing adequate water for the crops in the dry season.

Rubber, which is the most important primary commodity in the region, being a perennial crop does not require as much water as other commodities. In fact, prolonged dry and hot weather, as is usually the case during the El Nino period, is a 'welcome' phenomenon since it could contribute positively to the rubber tappers. Fewer rainy days means more tapping days for them. Similarly, the sugar plantations respond positively to long dry spells as they could increase the sugar content of the sugar cane, as long as water is available during the establishment and growing period.

The more significant effect of drought would be on the household front. Prolonged drought brought about by El Nino, as was the case during the El Nino of 1982/83 and the more recent one in 1997/98, resulted in a serious decline of water levels at the dams, to almost critical levels. This resulted in a very serious water crisis especially within the federal capital, Kuala Lumpur and its surrounding vicinity. The very low rainfall during the El Nino of 1997/98 resulted in water rationing for 1.2 million people in the area. This created many inconveniences for the people and disrupted many economic activities. At the peak of the drought period, the residents of Kuala Lumpur were given rationed water supply on alternate days. For some parts of the city, water was distributed by a large fleet of water tankers. Even those arrangements were not sufficient to fulfill the water need of the population. Other parts of the country did not face

similar acute problems, even though some rationing was also imposed especially in major cities.

Concerning the health aspect, numerous cases of vector-borne disease outbreaks associated with anomalies were reported to accompany the 1997/98 El Nino event. Drought induced famine, which was aggravated by poverty and poor sanitation, increased the vulnerability to diarrhea and cholera, especially in Indonesia, Malaysia and the Philippines. The prolonged dry weather and drought resulted in a lack of clean drinking water especially in the rural areas. The drying up of rivers and streams enabled mosquitoes to survive at high altitudes, with the resultant increase in the outbreak of malaria, particularly in Irian Jaya and Papua New Guinea, India, Thailand and the Philippines. Similar conditions enhanced the upsurge of dengue fever in Malaysia, Thailand and Indonesia.

Haze related effects

The spin-off effect of prolonged hot and dry weather is the haze problem. It was estimated that the dry weather triggered widespread forest fires estimated to have claimed 1.5 to 2.0 million acres of forest on the islands of Sumatra and Borneo. The other source of fires came from the clearing of land for agricultural purposes, both by big corporations and small farmers, since burning is claimed to be the most efficient and practical way to clear land for crop cultivation. Persistent southeasterly wind brought smoke particulates to the country, spreading the widespread haze to the whole nation.

The estimate for haze related damage in selected sectors in Malaysia in terms of the economic losses brought about by the El Nino of 1997/98 was US\$ 210 million. While this is most likely an underestimate, this amount by comparison is sufficient to finance all of the federal government's social programs for three years. According to the Worldwide Fund for Nature, the smoky haze caused by forest fires, drought and wind, incurred an estimated loss of up to US\$ 6 billion world-wide. This included both the direct cost such as loss from agricultural output, and the indirect cost through medical bills and a reduction in tourism industry. An estimate by EEPSEA of the total economic loss in the three most affected countries in ASEAN was US\$ 1.38 billion, in which

US\$ 310 million was incurred in Malaysia, US\$ 63 million in Singapore, and US\$ 1,012 million in Indonesia. The loss in Malaysia included both the economic damage and the abatement costs, such as fire fighting, monitoring and enforcement activities.

The severe haze, brought about by El Nino weather change, triggered many studies. In particular, there were concerns and interests by the government and researchers on the possible impact of the haze across economic sectors. The economic sectors badly affected by the severe haze episode were the tourism industry (including the hotel industry), the aviation and transportation (especially shipping) industries and agricultural industry. In fact, it is fairly reasonable to say that it cuts across all sectors, either directly or indirectly, due to its hazardous nature to humans. Reviews on some of these findings are presented below. Special attention is given to the haze episode of 1997/98, since this is the worst to hit the country.

Impact on human health

The World Health Organization concluded that the haze-related air pollution problems, as experienced during the El Nino of 1997/98, represent a substantial health risk to the public. The main component of the haze that adversely affects health is the particulate level, which is associated with a range of adverse, non-cancer health impacts. Whilst the risk of long-term health effects due to a single haze episode is difficult to assess, the short-term effects are fairly obvious. Increased mortality, hospital admissions, emergency room visits and respiratory related problems during the haze episodes represent some of the immediate effects of haze on health. This is the direct impact of haze on health, since it has been established that the excessive emission of suspended particulates is associated with aggravation of respiratory tract infections, asthma, chronic bronchitis, emphysema and conjunctivitis. A report by EEPSEA indicated a conservative cost estimate of RM 2.1 million for upper respiratory tract admissions during the first fifteen days of September 1997, which was the peak of the haze episode, as compared to RM 1.1 million for the months of July and August for three government hospitals in Kuala Lumpur in the same year. Hence, EEPSEA estimated that the total health damage for the 1997 haze episode was about RM 20.1 million.

Mohd Shahwahid and Jamal obtained a quantitative health cost by using a dose response function to provide a relationship between how much illness a given dose of haze pollution causes, with subsequent losses in productivity due to illness. The cost was calculated based on the cost of illness in terms of hospital admission, purchase of medicines and related productivity losses. An estimated value of RM 21 million was identified as the adjusted cost of illness arising from the 1997/98 haze episode.

Impact on animal production

There has not been a comprehensive study to evaluate the impact of haze on the health and subsequently the production of livestock in this country. Whilst there are studies which indicated that the haze of 1997/98 did have some adverse effects on animals, the economic losses incurred were insignificant. The effect on health and production was also very minimal with a reported drop in the production of chickens at less than 5%. For the pig industry, there were increased cases of respiratory problems, poor growth and abortion, especially during the peak haze period. The estimated economic loss, however, was also very small.

Impact on fishing industries

The effect of haze on aquatic organisms and subsequently the marine and aquaculture industry is due to its ability to reduce light penetration to aquatic organisms. The reduction of light intensity has an adverse effect on aquatic organisms and subsequently on the overall food chain and the final fish resources. Similarly, 'acidic' precipitation could result in decreased pH of water bodies, hence effecting the survival, reproduction, growth and movements of aquatic organisms. This could result in a significant decline in fishery resources and stocks.

Coupled with that, the reduced visibility at sea would discourage fishing activities, especially in the open sea. This resulted in a decline of fish landings during the haze period, which led to an estimated decline in consumer surplus of RM 40.7 million. On the assumption that the supply is very inelastic, the estimated welfare loss to society is almost equivalent to that of the decline in consumer surplus. A study conducted to evaluate the impact of haze on shrimp culture estimated a financial loss

of RM 117 million in the country, primarily due to lower survival rates and productivity.

Impacts on aviation industry

This is derived from the income foregone due to flight cancellations and closure of airport operations. For the period between August 1997 and November 1997, there were 3,278 flight cancellations and 1,049 flight delays due to poor visibility caused by haze. Out of this, the total loss due to flight cancellation alone accounted for RM 19.4 million and another RM 2.4 million due to flight delay. The bulk of the losses were incurred by airports in the states of Sarawak, which accounted for about 80% of the loss. Poor visibility from haze may also have been a factor in the crash of a jetliner in Sumatra on September 26 that killed all 234 people aboard, as well as for a series of near fatal collisions. For the year 1997, there were four collision accidents in the Straits of Malacca, reportedly due to reduced visibility.

Impact on tourism industry

The impact of haze on the tourism industry is quite obvious. Smoggy, smoke laden air and 'blackish sky' rather than normal 'blue sky' do not attract tourists. Similarly, heavy haze disrupted air travel, forcing cancellation of flights, closure of airports and diversion of aircraft due to their inability to land because of poor visibility. During the period, the hotel industry suffered heavy losses from both the low hotel occupancy rates as well as the poor food and beverage earnings. At the peak of the haze incidence, the average room occupancy of five star hotels in Kuala Lumpur plunged to as low as 30%, against the normal 80 to 90% during the usually busy month of October. Similar losses were expected by other tourism-related industries. Whilst the actual loss due to haze alone is rather difficult to assess since the drop could be due to many other factors, including the economic recession which began at almost the same time as the haze period, the economic loss during the period was quite substantial. The tourism receipts, which had contributed RM 11.3 billion in 1996, dropped to RM 10.5 billion in 1997 and RM 9.3 billion in 1998. During the same period, tourist arrivals dropped from 7.1 million in 1996 to 6.2 million and 5.5 million in 1997 and 1998 respectively.

Impact on agriculture industry

Environmental stress, in the form of climate variation, does affect crop yields. Among the most important climatic factors that could result in stress to crop growth and hence crop productivity are the rainfall, temperature, sunshine and air quality. Generally, agricultural commodities in the tropics require at least five hours of sunshine a day, sufficient water especially during the growing period, and little variation in temperature regime. Hence, theoretically an El Nino episode, which is associated with prolonged drought and poor air quality, could directly affect the yield. The impact could be immediate or delayed to a later period. For example, the lower oil extraction rate for palm oil in both 1997 and 1998 could be due to the haze incidence during the period. Based on this assumption, it was postulated that palm oil yield was reduced by 3% in 1997 and 1.1% in 1998, which was equivalent to a loss of about RM 427 million for the two periods. Similarly, the New Straits Times reported a yield reduction of about 10% in rice production due to haze in KETARA, which is one of the eight rice granary areas in the country. This relationship, in terms of effect and impacts, between the El Nino weather change and agricultural development is the crux of this study.

Commercialization is a Key to the Development of CGPRT Crops in Asia

*Budiman Hutabarat**

Economic growth

The developing countries in Asia have enjoyed remarkable economic growth in recent years prior to 1997. Per capita income in the ESCAP region as a whole as measured by GDP increased by 1.85% per annum from 1988 to 1997. In the developing countries of the region, it grew much faster at 4.69% per annum in the same period. As income grows and urbanization continues, people in developing countries are diversifying their diets to

* Programme Leader, Research and Development, UN/ESCAP CGPRT Centre and Economist at the Centre for Agro-Socio-Economic Research and Development (CASERD), both located in Bogor, Indonesia.

include more animal products such as meats, eggs and dairy products. This trend is likely to continue for some time to come and has opened up opportunities in the region for: (i) improvement in the nutritional status of the population, since animal products provide protein and micro-nutrients; (ii) creation of employment opportunities for the rural poor as livestock and fisheries traditionally have been an important source of income; and (iii) sustainable intensification of food and feed production by smallholders.

Per capita consumption of milk, meat and fish in Asian developing countries in the last decade increased by 2.4%, 4.9% and 3.1% per annum, respectively, while consumption of cereals increased by only 0.8% per annum. As a consequence, feed grain utilization per capita has also been increasing rapidly by 3.4% per annum. As the total Asian population is still growing by around 1.5% per annum, the indirect demand for feed grains will increase by around 5% per annum, whereas total demand for human direct consumption of cereals will grow by 2.3% per annum. Accordingly, total demand for cereals, both for human consumption and animal feed will increase by 6% per annum.

Aside from the consumption effect, the demand for feed grains will also be influenced by technological changes that have been taking place in animal production methods and the use of improved breeding lines of livestock and fish that are compatible with intensive feeding systems. As land available for grazing is squeezed between two antagonistic forces of urbanization and crop production expansion on one hand, and preservation and conservation of the environment on the other, feed resources become limited. In India, for instance the source of green and dry fodder has been under severe pressure due to the lack of clear property rights, agricultural intensification and overgrazing.

As the demand for animal products for human food expands rapidly in most countries of this region, existing animal production systems that rely mainly on the traditional operations based on grazing can not meet the demand. Domestic supplies of crop residues and non-grain biomass, or cereals can no longer meet feed requirements. Asia has been importing a large amount of feed grains, mainly from the developed countries, such as the United States of America. China has

experienced declining growth of total grain production and unstable output of feed grains. In 1993, India was estimated to face a huge feed deficit around 23% to 47% to feed its livestock population. Similarly most manufactured feed and concentrates required by livestock farms in Laos are imported from abroad. In Pakistan, the main constraint to livestock production is considered to be inadequate feed resources.

Disadvantages of supply-side measures

Much of the growth in foodcrops production in the developing world is attributed to the impact of the green revolution. This is based on the hypothesis that small farmers in traditional agriculture are already efficient in allocating their resources and responding to price incentives. It implies that increases in productivity would have to come from introduction of new high pay-off inputs into traditional agricultural systems.

At a time when famine seemed unavoidable, new high yielding varieties of wheat and rice were introduced to Asian farmers along with fertilizers, pesticides, and mechanized farm equipment resulting in unprecedented bumper harvests. India, a country that had previously struggled to increase its food production to catch up with its population growth, has maintained grain reserves to be used against famine. Indonesia, one the world's largest rice importers, briefly experienced self-sufficiency and exported rice. The major components of the supply-side policies in the green revolution are: (1) the expansion of irrigated areas, (2) the availability and rapid diffusion of high yielding varieties, (3) the use of fertilizers, (4) education and extension of the farmers, and (5) rural infrastructure. The first three components intertwine in a highly synergistic interaction, whereas the last two components are more neutral and their benefits can accrue to a whole range of activities. The expansion of irrigation facilitated multiple cropping and along with an increase in irrigated areas and in the use of fertilizers, there was considerable acceleration in the diffusion of high yielding varieties.

The development of irrigation facilities was possible due to government involvement that started from conducting surveys of irrigation potential and putting investment in the irrigation projects. Also, the public sector provided some subsidies in the development of irrigation. The

expansion of fertilizers use was principally due to: (1) high returns from the use of fertilizer in irrigated land and improved varieties, (2) favorable price ratio between fertilizer and crop, (3) expanding and assured supply from domestic production plus import, and (4) education and training of farmers in the efficient use of fertilizer. In stimulating the demand and expanding the use of fertilizer, subsidies set by the government played an important role. Even until today, some subsidies on agricultural inputs such as fertilizer, seed, credit and investment grants and development of irrigation system are still in place on rice, cassava, maize and soybean in China, Indonesia, Pakistan, the Philippines, Thailand and Vietnam. Guaranteed price and price support programmes, import tariff and non-tariff barriers were also implemented to protect these commodities in certain countries. Some countries also have set policies to facilitate exports with special credit and financial services that result in the reduction of marketing and exporting costs.

Therefore, substantial public expenditure on various elements is involved in agricultural modernization all over the world. However, as experience has shown, the greatest success of recent technological change in agriculture is notably confined to wheat and rice crops grown in relatively good physical environments. And unduly high supports have had an injurious effect in terms of inducing or accentuating distortions in domestic cropping patterns or resource use and/or in terms of relationships with world grain prices. Moreover, due to total production increase, overall food prices were pushed downward, while at the same time input prices continued to rise, making food crop farming no longer profitable to farmers unless guaranteed prices were established. For CGPRT crops this situation is real. In areas that do not have access to irrigation or market and infrastructure systems, i.e. places where CGPRT crops are widely grown, supply-side approaches would likely be unsuccessful. All the conditions that were once conducive and the resources that were easily available to support the green revolution have become luxury goods now, especially to Asian countries. This requires an effort to seek an alternative way to boost CGPRT crop economies in a broader perspective, that links supply-side measures and demand-side policies consistently.

Farm and industrial linkage of CGPRT Crops

Intra- and inter-sectoral linkages of agricultural activities have often been overlooked. For this purpose, the CGPRT crops can still be justified in many countries of Asia. About 77% of soybean production is processed by the crushing industry to produce soybean meal and oil, and 48% of cassava goes to processing and animal feed in India. In China 64% of maize production is allocated to feed, 43% of soybean is crushed for oil, and 60% of roots and tubers used as feed or converted to other products. In Pakistan 25% of maize production goes to feed industries, and all soybeans are used for processing and feed. In Indonesia 38% of cassava production is processed or used for feed, all soybean is processed, and nearly 2% of maize is processed or used for feed. The maize figure is surprisingly low, below expectations. It is conceivable that the rate is much higher but the data are not available to substantiate the argument. In the Philippines 81%, 93%, and 84% of maize, soybean, and cassava production, respectively, goes to processing or is used as feed.

At lower levels, farm linkages are quite obvious, for example between crop and livestock production. Animal raising is vital to the welfare of the rural poor in many respects: (i) as an important source of income; (ii) as an asset available to the poor, in particular, poor women; (iii) livestock manure and draft power are used to maintain soil fertility and support farming, (iv) as a means to exploit common property resources for income, and (v) to help the farmer to diversify his income source and at the same time reduce its variability.

Coarse grains, pulses, roots and tuber crops (CGPRT crops) dominate animal feeds. These CGPRT crops are grown mostly by small-scale farmers in less advantaged, remote and marginal areas in Asia, where rural poverty prevails. They are also known to be inelastic or havenegative income elasticities, which means that direct demand for these crops declines with increase in per capita income. This pushes the product prices down and the demand declines over time, which further causes persistent stagnation and marginalization of CGPRT crop farming. However, as more people demand more processed food, the demand for CGPRT crops as raw material for agro-industry should grow. This is an element of

demand-side factors that requires further consideration.

Direct consumption of CGPRT crops by people may have been decreased, except for a few crops such as maize and some roots and tubers. But, today food-processing technology on maize has been developed to produce livestock and poultry feeds, industrial and food materials, such as starch. Soybean has a long history of being consumed in different forms of processed foods such as tempe, tofu, soysauce, fermented paste and others. It has also been developed as an important material for cooking oil. With simple processing technology, another product, soybean milk, has gained popularity in Asia to substitute for cow's milk. Aside from its conventional uses, cassava starch and flour can be mixed with wheat flour or used to produce syrup and alcohol. All these processing activities contribute to greater opportunities for employment and additional income for rural people in Asia.

The massive increase in feed and other processing industry requirements should, therefore, be beneficial: firstly, to intensify CGPRT crop production and commercialize the products; secondly to increase and stabilize farmer's income, and eventually to reverse the chronic marginalizing trends and reduce poverty in developing countries.

Increasing livestock consumption will affect cereal prices and further induce an increase in demand for CGPRT crops. The increase in this demand will push their prices up. At the other end it could improve the livelihood of CGPRT crop farmers.

Market development through enhancing commodity exchanges

As agriculture continues to dominate the economies of most Asian countries, it should come as no surprise that economic development has to be undertaken in gradual fashion through agro-industrialization by means of agricultural commercialization. The sector provides employment to more than 45% of the population, is a major source of foreign exchange, and supports small-scale agro-industry. It is true that the green revolution has had a profound effect on farm management, but at the same time it has set the stage for new challenges to agricultural development. As public capital resources become

limited in most developing Asian countries, the development of CGPRT crops must be put in the context of bringing about broad-based development of agriculture.

Due to the green revolution, farm producers have used an increasing number of purchased inputs and continually struggled to keep pace with a dynamic technical and economic environment, which is characterized by an increasing trend of prices of inputs and declining trend of prices of outputs. Traditional agriculture may be "poor-but-efficient", but this is not justification for the use only of high pay-off inputs. The very success of the green revolution might have caused farmers in developing countries to be more dependent on the high pay-off inputs and policy makers to overlook the importance of the farmer as the rational decision maker on his farm.

In the more complex economic, trade and physical environment we are facing today, where liberalization and globalization have been put into the international agenda with the support of developed countries, Asian farmers are forced to compete with their counterparts in developed countries regardless of differences in the state of infrastructure and markets, and the nature of food policies and subsidies they are facing. The challenge in developing CGPRT crops is how to break the vicious causation circle between a lack of market development and inadequate growth in output. Under the existing condition of stagnant CGPRT crop production in many developing countries of the ESCAP region, the countries concerned should take a hard look into their strengths and weaknesses, external opportunities, and overall existing policies. It is conceivable that some policies that have been put in place now are detrimental to CGPRT crop development. Hence the development of CGPRT crops in both production and marketing should include at least three measures:

- Economy-wide policy reforms that induce evaluation of markets and trade liberalization and financial sector reforms,
- Infrastructure development including expansion and improvement in transportation systems, expansion and improvement in market infrastructure, telecommunications, and power supply,
- Institutional development that requires regulation on legal ownership of financial

intermediaries, strengthening the capacity of the private sector in particular of small-scale traders and smallholder's organizations, establishment of regulatory institutions to reduce performance risk exposure of economic agents, and introduction of bonding and insurance intermediaries.

Economy-wide policy measures are required to overcome the problem of developing agricultural marketing facilities that can absorb and dispose of agricultural marketed surplus. Associated with this development is a need for recognition by national policy makers that increased production potential alone is insufficient to generate agricultural development. The fulfillment of rural marketing needs, which are most pressing in Asian countries, requires infrastructure development (such as storage, grading, transportation and local assembly facilities) and greater institutional support (such as provision of agricultural market extension, information and knowledge) to maintain the agribusinesses. There are many market arrangements to choose from and that can be adjusted to particular conditions to help modernize agriculture. Contractual arrangements have long been in place in many countries. The system provides better opportunities for securing resources and technologies to small farmers and exporters. Through this arrangement bargaining power and comparative advantage of small farmers can be generated.

Hedging using futures and options may also be an alternative useful tool for short and medium-term protection of farmers' revenue. The principles are simple, but education and practice are required before implementation. However, small producers

might face many barriers preventing them from implementing this tool. To overcome these barriers, a new ethical intermediary is needed, who would aggregate volumes required to provide minimum-risk comfort to the brokerage community and pass on the benefits of hedging to farmers.

The commodity exchange and warehouse receipt systems can be another alternative means of providing short-term financing using production as collateral, through which farmers can effectively secure financing for their production activities, while at the same time protecting themselves from price risks and fluctuation at harvest time.

As was argued nearly forty years ago, modernization of agriculture requires facilities and services that can be classified in two main groups: the essentials, a must to enable a farmer to adopt an innovation, and the accelerators, important to get an innovation adopted but not indispensable. The essentials are a market for farm products, constantly changing technology, local availability of supplies and equipment, incentives, and transportation; and the five accelerators are education for development, credit, group action by farmers, improving and expanding agricultural land, and national planning. These elements are still relevant to today's agriculture.

The paper has argued that the green revolution paradigm can no longer be reiterated in the efforts to pursue development of CGPRT crops, but rather the initiatives should follow a broad-based development policy, linking supply-side measures and market development policies that include economy-wide policies, infrastructure and institutional development.

CGPRT Centre News and Activities

FEED

A new study entitled "Prospects of Feed Crops in South Asia (FEED)" was officially launched in July 2001 firstly by appointing the regional advisor. The regional advisor is Dr S.S.E. Ranawana, Director General of Animal Production and Health, Department of Agriculture, Sri Lanka. The national experts will be appointed soon. The study will be conducted until the end of 2002 with support from the Government of Japan to the CGPRT Centre.

The general objectives of this project are to elucidate and analyze potential, weaknesses, opportunities, constraints and policy options for development of feed crop farming in South Asian developing countries in balance with the rapid development of livestock and aquaculture industries in Asia. More specifically, the objectives may be further broken down into: (i) to analyze historical dynamics and future trends of demand and supply for feed crop products; (ii) to evaluate potentials, weaknesses, opportunities and

constraints for expanding feed crop farming in the participating countries; (iii) to propose possible cooperation schemes for trade and development of feed crops/products among Asian countries; and (iv) to formulate policy options to promote sustainable development of feed crop farming in the participating countries.

The achievements of the project will be provided to policy planners, producers, processors, traders and researchers who are concerned with feed crop development in relation to the livestock farming and industry. The outputs will be provided not only to the participating countries but also to other countries. The participating countries are India, Nepal, Pakistan and Sri Lanka, as well as Bangladesh and Myanmar as observers.

ELNINO

The draft reports of the first phase country studies are being revised in response to comments made by the regional advisor and project leader. The project entered the second phase from June, as each national expert started the country study (June 2001 to April 2001). Assuming that another El Nino event will occur by late 2001, it is important to monitor farmers' actions and responses during the event to investigate local level coping mechanisms. Thus the country study includes survey on farmers' responses at the beginning, mid and end of the 2001/2002 crop season. The interim reviews of the country studies are planned for Malaysia in October 2001, the Philippines in November 2001, Papua New Guinea in December 2001, Indonesia in January 2002 and Thailand in February 2002.

IS/DB

Information Services:

- Working Paper No. 60 entitled: "CGPRT Crops in the Philippines: A Statistical Profile, 1990-1999" has been published and distributed. Starting with this publication, we use the new cover design following the new format design for all ESCAP publications.
- Information cards for the library and database section have been made and distributed to all Palawija News subscribers. This is one of the

efforts to introduce the Centre's Information Services to wider audience.

- Updating of the Centre's website was completed in August; the same activity was also carried out for the Centre's Database On-line.
- Preparation for renewing the Centre's display board in our main lobby is on-going.

Database

The database section activities include:

- Preparation of a Working Paper entitled "CGPRT Crops in the Philippines: A Statistical Profile, 1990-1999".
 - On-going data collection, compilation and formatting for an agricultural statistical profile of Nepal, 1970-1999.
 - Support for ELNINO research project in analyzing climatic data.
 - Regular updating of the Centre's website.
 - On-going restructuring of the Centre's database on-line website.
-

MAPSuD/Metropol

The inventory of the current situation and needs of Asia and Pacific countries in the field of socio-economic and policy analysis of CGPRT crops is in progress. This inventory aims at identifying the current human resources, topics and methods applied as well as future needs in terms of training.

A list of target countries has been established through consultation with all CGPRT staff in order to use a multicriteria selection process. Among the criteria selected we included the role and importance of CGPRT crops in the country, quality of links with the CGPRT Centre, and fluidity of communication. Among all countries in the region, a list of priority target countries has been established. These countries are Bangladesh, Cambodia, China, Fiji, India, Indonesia, Lao PDR, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Sri Lanka, Thailand, Tonga, Vanuatu, and Vietnam.

A specific survey has been designed with the support of the CGPRT scientists. It consists of a two-step questionnaire with specific modules to be sent first to research and development centres working on CGPRT crops in the region and then to

their specific units involved in socio-economic and policy analysis on CGPRT crops.

The first step survey (Centres Survey), a short questionnaire, has been sent to 71 centres by electronic mail, fax and regular mail. It concerns issues related to the staffing capacity of these centres, their current activities in the field on socio-economic and policy analysis on CGPRT crops, as well as priority topics or themes for the future and the tools that are needed to deal accurately with these issues.

Answers have been received so far from 40% (by September 10th) with very good reactions from the respondents, who mostly are the heads of these centres, and 75% of the countries have provided at least one entry for the first step survey. The answers are entered in a database and also serve as an input to the second step of the survey (Units Survey) which consists of a more detailed questionnaire to be applied at the unit level (Department, Program, etc.) within these centres, focusing on the current tools and methods applied in the field of socio-economic and policy analysis, as well as future needs.

Key respondents have also been identified and contacted in order to complete the list of institutions to be contacted in Asia and the Pacific region.

ECOPOL

The project was officially completed in December 2000. However, follow-up activities have continued until June 2001.

After three years of project implementation, the ECOPOL project has generated a new method for the management of public decisions, has achieved the development of new tools in this field, and has yielded practical results regarding the decision process in Vietnam. A set of related publications highlights most of these achievements

Among these outputs, two must be highlighted. The first one is a methodology handbook presenting the ECOPOL method for public decision management entitled "Reconciling actors' preferences in agricultural policy – concepts, methods and tools for a new management of public decisions". It is a synthesis of the work conducted by the ECOPOL team during the implementation of the ECOPOL project. Drawing from Vietnam and

Indonesian case studies, and other experiences, this book proposes a participatory approach for the integration of all stakeholders in the process of public decision making with particular focus on agricultural policies. It combines a theoretical framework with practical tools and methods and is illustrated with case studies. Co-published by the CGPRT Centre and CIRAD, it is due to appear in 2001.

The second is the P.A.C.T. method (Pro-Active Conciliation Tool) developed and used for ECOPOL project activities in Vietnam. The PACT method combines "institutional surveys" and visualisation software which enables one to compute, analyse and show results from a qualitative approach of stakeholders' perceptions concerning their own situation, other actors' and their future possible evolution. This method and its guidelines for implementation will be co-published by CIRAD and the CGPRT Centre in 2001.

Another practical tool developed by the ECOPOL project is the PRACTYP method designed for the participatory identification of stakeholders with an expert meeting approach for the building of typologies as well as the building of agreements between actors within the pig commodity system in Vietnam.

Regarding field results, the organisation of training on institutional analysis reporting and prospective analysis allowed the organisation of two workshops. The first one related to the institutional analysis implemented in Vietnam on the performance of the rice and pig commodity chains, and the second about the use of prospective analysis tools to foster the emergence of a collective strategy for the development of the pork sector.

These two workshops were attended by representatives of the different types of actors concerned with these commodity chains. They led to the establishment of an inter-professional group including pig farmers, wholesalers-slaughters, provincial agricultural services and government representatives. These stakeholders agreed to co-ordinate their actions in order to improve the quality of pork products (leaner meat in a first stage and safer meat products later on) and their supply to consumers, mainly for the Vietnamese urban market first and for exportation in a second stage. The stakeholders are currently establishing a contract together to settle this collective scheme.

Announcements

PGDip./MSc. Programmes: Grain Storage Management and Post Harvest Horticulture

Training is provided by tutors currently working in international consultancy, research and development throughout Africa, Asia and Central and South America.

Both courses are available in two modes of delivery:

In Attendance: a 16 week, highly intensive PGDip programme at NRI in the UK, followed by an MSc. research project usually conducted in the student's home country. Dates:

PGDip: 11th March to 28th June 2002

MSc: 1st July 2002 onwards

Distance Learning delivered via the internet to your office or home computer, enabling you to study at your convenience. Ideally suited to busy professionals. Active participation between students from around the world is encouraged through discussion group exercises, bringing a lively multi-faceted approach to problem solving. Starting dates are flexible.

For further information, contact:

John Brice

Natural Resources Institute, University of Greenwich,
Central Avenue, Chatham Maritime, Kent ME4 4TB, UK

Telephone: Int. +44 1634 883797

Fax: Int. +44 1634 883567 or 880066

E-mail: j.r.brice@gre.ac.uk

Internet: <http://www.nri.org/Training>

Training Programme for the Food Industry and Agribusiness

Post-harvest technology of perishable crops 16-20 September, 2002

This course deals with major aspects of the post-harvest physiology of fresh tropical and non-tropical fruits and vegetables. It addresses the influence of such post-harvest factors as temperature, RH, air composition and velocity on quality aspects (e.g. firmness, colour, growth,

chemical composition etc.); and aspects of unit operations and storage technology, such as drying, cooling, MAP (modified atmosphere packaging) and CA (controlled atmosphere storage).

Appropriate food packaging 23-27 September, 2002

This course is directed at packaging materials and cost-effective methods of packaging. Topics addressed within it are: the properties of flexible and rigid packaging (board, plastic, metal, glass); quality management and specifications; failure mode and effective analysis; visual aspects of communication; packaging methods/systems such as MAP/MAC (modified atmosphere packaging and containerising); aseptic packaging; physical distribution; and storage and handling.

Seminar on food safety and consumer concerns 30 Sept - 4 Oct, 2002

This seminar is a joint activity of the programmes on food & nutrition and food industry & agribusiness. Emphasis will be put on consumer and policy issues. Reference will be made to technological issues (hygiene, HACCP, microbial contamination, good manufacturing practices).

Quality assurance systems in food processing enterprises 7-18 October, 2002

This course focuses in imparting and sharing knowledge and experiences of the specific features of quality and quality management systems, of food hygiene and sanitation, and of health and product safety issues. Participants familiarise themselves with the principles of the following: GMP/GHP (good manufacturing and hygiene practices), TQC/TQM (total quality control and total quality management), SQC (statistical quality control), product quality monitoring, HACCP (hazard analysis critical control point), Codex Alimentarius (international food standards), ISO-9000 (quality management and quality assurance standards), certification, food standards and legislation as well as internal auditing.

Application of GMP and HACCP in food processing enterprises
21 Oct – 1 Nov, 2002

This course focuses on the application of GMP/GHP and HACCP in food processing enterprises. Participants work on a practical assignment in small groups in selected food processing enterprises in the Netherlands.

Marketing management, research and product innovation
4-15 November, 2002

This course addresses specific features of marketing and the food supply chain. Participants familiarize themselves with the principles of the following: core concepts; market research; market segmentation and positioning; price policy and cost analysis; product portfolio and product analysis development; marketing channel performance; sampling and forecasting techniques. In addition a workshop is organised on "Innovation in food production systems" (on Friday and Saturday mornings) addressing new protein foods on product quality and consumer acceptance, consumer behaviour and preference, selection of raw materials and ingredients.

Agribusiness development and investment analysis
18-29 November, 2002

Identification of potential business opportunities in the agro-processing and value-adding industry; market-economic analysis and assessment of potential business opportunities; translation of potential business opportunities in realistic investment projects; formulation of 'bankable' investment project proposals. In addition a workshop is organised on "Efficient consumer response" (Friday and Saturday mornings) addressing the topics: supply chain management; category management; efficient replenishment and enabling technologies.

For further information, contact:
IAC
P.O. Box 88,
6700 AB Wageningen, the Netherlands
Telephone: +31 317 495 495
Fax: +31 317 495 395
E-mail: training@iac.agro.nl
Internet: www.iac.wageningen-ur.nl

Coming soon



This catalogue will be distributed to all Palawija subscribers and is also available on request.

CGPRT Centre

The Regional Co-ordination Centre for Research and Development of Coarse Grains, Pulses, Roots and Tuber Crops in the Humid Tropics of Asia and the Pacific (CGPRT Centre) was established in 1981 as a subsidiary body of UN/ESCAP.

Objectives

In co-operation with ESCAP member countries, the Centre will initiate and promote research, training and dissemination of information on socio-economic and related aspects of CGPRT crops in Asia and the Pacific. In its activities, the Centre aims to serve the needs of institutions concerned with planning, research, extension and development in relation to CGPRT crop production, marketing and use.

Programmes

1. Research, which entails the preparation and implementation of studies covering production, utilization and trade of CGPRT crops in the countries of Asia and the Pacific.
2. Training of national research and extension workers,
3. Information and documentation which encompasses the collection, processing and dissemination of relevant information for use by researchers, policy makers, and extension workers.

Palawija News

Contributors are invited to submit concise summaries of significant social research related to CGPRT crops for publication. Figures (graphs or tables) may accompany the article. All articles are subject to editing to meet space limitations.

Please send all queries relating to articles in *Palawija News* to Publications Section, CGPRT Centre, Jalan Merdeka 145, Bogor 16111, Indonesia.

Palawija News is distributed free of charge to interested individuals and institutions. Please send address corrections and additions to the Distribution Officer, Publications Section.

CGPRT CENTRE
Publications Section

Editor: Douglas R. Stoltz
Production: Agustina Mardiyanti
S. Tayanih (Yayan)
Distribution: Fetty Prihastini
Printer: SMK Grafika Desa Putera



CGPRT Centre
Jalan Merdeka 145,
Bogor 16111, Indonesia
Telephone: (62-251) 343277, 356813
Fax: (62-251) 336290
Cable: ESCAP CGPRT Bogor
E-mail: cgprt@indo.net.id
URL: <http://www.cgprt.org.sg>
Database: <http://www.cgprtstat.org>

Palawija News
Volume 18, Number 3
