REPORT OF THE

EXPERT CONSULTATION ON
CROP DIVERSIFICATION IN THE
ASIA-PACIFIC REGION

4-6 July 2000
Bangkok, Thailand

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
REGIONAL OFFICE FOR ASIA AND THE PACIFIC
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EXPERT CONSULTATION ON CROP DIVERSIFICATION IN THE ASIA-PACIFIC REGION

I. INTRODUCTION

The Expert Consultation on Crop Diversification in the Asia-Pacific Region was held at the FAO Regional Office for Asia and the Pacific (RAP) in Bangkok, Thailand, from 4 to 6 July 2000. It was organized and sponsored by FAO. Experts from Bangladesh, China, India, Japan, Malaysia, Nepal, Philippines, Sri Lanka, Thailand and Viet Nam participated in the Expert Consultation, together with representatives of FAO, ADB, UNCTAD and APSA. The list of participants is given in Annex 1.

The Senior Plant Production and Protection Officer, FAO/RAP, presented Introductory Remarks in his capacity as the organizer of the Consultation. The FAO Assistant Director-General and Regional Representative for Asia and the Pacific, Bangkok, Thailand, delivered the Welcome Address. The Director of the Plant Production and Protection Division, FAO, Rome, Italy, chaired the First Session of the Consultation.

II. OPENING OF THE MEETING

Mr. M.K. Papademetriou, Senior Plant Production and Protection Officer, FAO, Bangkok, Thailand, pointed out that crop diversification could be a very important instrument for food and nutrition security, income growth, poverty alleviation, employment generation, judicious use of natural resources, sustainable agricultural development and environmental and ecological management/improvement. Remarkable progress has been achieved in crop diversification in certain countries of the Region, while in others the progress is very limited. The opportunities for further promotion of crop diversification appear to be good. However, at the same time, the problems to be addressed are many and varied. Strengthening cooperation among countries, institutions and individual scientists in this field is very important. A forum like this will allow us to learn from each other. We must explore the possibilities of sharing our experiences for mutual benefit. It is in this context, that this Consultation has been convened.

This is the second time FAO has held an Expert Consultation on Crop Diversification in this Office. Dr. R.B. Singh, ADG/RR, organized the First Expert Consultation on Crop Diversification in Bangkok in September 1987. FAO continues to attach high priority to this issue and the presence here of the Director of the Plant Production and Protection Division (AGP), FAO, Rome, Dr. Mahmud Duwayri, is an indication of the importance which the AGP Division is attaching to Crop Diversification.

Dr. R.B. Singh, Assistant Director-General and FAO Regional Representative for Asia and the Pacific, welcomed the participants on behalf of the Director-General of
FAO, the staff of the Regional Office and on his own behalf. Highlighting the importance of crop diversification for the countries of the Region and the need for closer inter-country cooperation, he greatly appreciated the positive response received from the participants.

He stated that crop production is the most important economic activity of the rural areas of the Region and it makes the highest contribution to the Gross Domestic Product of many countries as compared to other sectors. The crop sector also has strong linkages with other sectors of the economy like livestock, industry, trade and commerce, whose output is significantly influenced by the performance of the crop sector. Due to these factors, the growth rate of the crop sector is a major determinant of the growth rate of the overall economy of many countries.

Notwithstanding the highly satisfactory crop production growth rates during the past 30 years in the Region, Dr. Singh drew attention to the slowing rates of growth in the recent years and emphasized the need for reversing the trend. It is recognized that the Asia-Pacific Region accounts for nearly 57 percent of the world's population, but has access to only one-third of the world's agricultural land. Water availability is fast declining, while there is widespread degradation of natural production resources. Therefore, the future strategy must be to produce more and more from not only the shrinking but also degrading resources.

Food and nutrition security, income growth, poverty alleviation, employment generation, judicious use of land, water and other resources, sustainable agricultural development and environmental and ecological management/improvement have assumed high priority in the various countries of the Region. Crop diversification could be an effective strategy in this direction. Every effort, therefore, needs to be made by governments to explore fully the potential and prospects of crop diversification to forge congruence of enhanced productivity, sustainability and profitability.

Crop diversification is an important instrument for economic growth. However, the ability of a country to diversify in order to attain various goals, would depend upon the opportunities for diversification and responsiveness of farmers to these opportunities. At the same time new problems, threats and challenges would have to be faced. Several of the commodity agreements have failed to the disadvantage of the majority of developing countries, such as the International Natural Rubber Organization, although rubber is an important commodity in the Region.

New opportunities that would benefit crop diversification are technological breakthroughs, changes in demand pattern, changes in government policy, development of irrigation and other infrastructure, development of new trade arrangements and others. Similarly, challenges and threats necessitating crop diversification result from:

- market and price risks;
- risk associated with existing crop management practices;
- adverse changes like degradation of natural resources and the environment; and
- socio-economic needs like employment generation, attaining self-sufficiency in some crops and earning foreign exchange from others.

The case of the green revolution in India presents a good example of the effects (positive and negative) of technology induced crop diversification. This technology
created opportunities for raising agricultural productivity through diversification in favour of high yielding period-bound cultivars of wheat and rice in areas endowed with reliable irrigation. In this way, green revolution technology resulted in spectacular growth in farm output which enabled the country to attain food self-sufficiency. However, the green revolution technology has also led to substantial shifts in area in favour of rice and wheat and a high level of crop intensification which are said to be causing degradation of ecology and natural resources like soil and water in various ways. For example, high crop intensity and intensive use of chemical fertilizers and irrigation are noted to be causing nitrate pollution, soil salinity and waterlogging; while burning of crop residues is contributing to air pollution. To face these challenges and problems there is an urgent need to diversify the cropping patterns.

Significant changes are taking place in domestic and international demand for crop products due to improvement in income and standard of living, fast urbanization, and changing life styles and preference patterns. Trade liberalization and development of transport infrastructure have opened new avenues of trade and have improved access to new and distant markets. This has created new opportunities for crop diversification, especially for enterprising and progressive farmers in the various countries.

Rice is the most important food crop in Asia and will remain so for many years to come. However, in marginal and upland areas of Asia, rice-based cropping systems have low returns. Shifting marginal areas out of rice into more profitable crops is seen as a solution. However, commodity-specific approaches are risky and, given the weak infrastructure and marketing base, may not achieve much for resource poor farmers in rainfed areas. Alternatively, flexible cropping systems for upland farmers that feature production of more income-elastic goods like horticultural products are a means of diversifying their income sources. Indeed, diversification away from rice to high-value crops such as fruits, vegetables and flowers has been successful in many countries of the Region, although quality and timely production are usually crucial to economic success with such high-value crops.

There is no doubt that significant progress has been made during the past few years in crop diversification in the Region. The level of success varies from country to country, but some success stories exist in every country. The fundamental principal of all successful diversification programmes is that they are driven by market demand. There is no point in diversifying into a crop for which market potential is limited. Governments can take several steps to reduce risks and improve marketing facilities through improved roads and communications, construction of wholesale markets etc. Access by farmers, private traders and exporters to credit also needs to be improved. Dynamic policies on balance between food self-sufficiency and food self-reliance will be needed.

However, in spite of the significant progress in crop diversification much more remains to be done in this direction. There is a need and scope to further promote crop diversification on scientific lines and realize its untapped potential. FAO looks forward to the advice and guidance of the participants concerning appropriate strategies leading to the realization of this untapped potential.
III. OBJECTIVES AND AGENDA

Mr. M.K. Papademetriou briefly presented the need and rationale for organizing the Consultation. He presented the objectives, the provisional agenda (Annex 2) and the details of the programme (Annex 3), which were duly adopted. The objectives of the consultation, in brief, were as follows:

a) To review the status of crop diversification in the Asia-Pacific Region, discuss the problems faced as well as strategies required for overcoming existing constraints.

b) Elaborate on the potential and opportunities for crop diversification for food and nutrition security, poverty alleviation and ecological security.

c) Discuss ways and means of strengthening collaboration on crop diversification.

IV. COUNTRY REPORTS

Bangladesh

Mr. M. Enamul Hoque mentioned that Bangladesh is endowed with favourable climatic and soil conditions for the production of a variety of crops all the year round. The country is rich in bio-diversity and genetic base. Thus, there are ample opportunities for crop diversification balancing the production of major crops with that of minor crops. A crop diversification programme (CDP) was launched in the country during the early 1990’s. A systematic arrangement of growing a variety of crops in rotation with rice was undertaken, based on farmers' choice and preferences with respect to soil and climatic conditions, thereby ensuring a variety of diverse dietary standards and an overall improvement in the nutritional status of the rural households. Due attention was given to the protection of nutrient balance in the soil and of all major basic resource endowments in crop production. Improved cropping patterns involving rotation of soil exhausting crops followed by recuperative ones, legumes in rotation with non-legumes, etc., are envisaged to enrich and maintain soil fertility and crop productivity.

The key objective of agricultural development, involving sustainable intensification of rice production and location specific attempts on crop diversification in predominantly small farmer holdings of Bangladesh, has aimed at achieving self-sufficiency in food grains production in a sustainable manner by improving the productivity on a short and medium term basis. Another objective is to attain self-reliance in the longer-term. To enhance farmers' income through the production of high-value crops and to help maintain a better soil structure for long-term sustainability, a recent policy statement on crop agriculture has called for a departure from "rice-led" growth to a more diversified production base that includes several non-rice crops. The area under wheat and maize during the period 1995-96 to 1997-98 has registered an increase of 15 and 95 percent respectively. The production of rice has exceeded 22.5 million tonnes and that of wheat has crossed the 2 million tonnes mark. Maize production increased by 138 percent during this period. The Government is also implementing programmes to promote crop diversification involving potatoes, oilseeds, pulses, spices and vegetables. Attempts are also being made to bring seasonal fallow lands under cultivation through appropriate packages of seed-fertilizer-irrigation technologies.
The Government also intends to promote commercialization of agriculture through production of export-oriented crops and high-value crops, along with selective small farm mechanization in the short, medium and long-term. In line with the accent on poverty alleviation, the other objectives are to increase rural employment through adoption of modern agricultural practices, achieve low and stable consumer food prices and improve the nutritional status of the population. The objectives focus not only on raising agricultural production but also on creating a vibrant, sustainable rural economy with agriculture at its core.

In order to attain the desired level of crop diversification and to accelerate technological advancement in this direction, the following strategies are being adopted:

- Develop HYVs of desirable growth duration, use hybrid technology and genetic upgrading of non-cereal crops and strengthen seed production programmes, particularly in the private sector.
- Introduce diversified cropping systems in order to free upland areas in the winter season for non-rice crops, so as to facilitate introduction of a third crop on the land under irrigated conditions - short duration mustard or a sandwich crop of grain legume could be introduced in between the 'Aman' and 'Boro' rice growing seasons.
- Introduce more efficient extension services, improve drainage and water management, ensure timely planting and soil fertility management, develop infrastructure and post-harvest processing and provide marketing facilities.
- Build up effective backward linkages through contract farming and captive farming; develop post-harvest handling including best quality packaging to prolong the shelf-life and to take care of agro-products from farm to retail markets; and organizing the small farmer households, through increased emphasis on precision farming.

Bangladesh agriculture is at the crossroads from the ecological, economic and ethical standpoints, as much of the motivation for investment in new technologies springs from commercial considerations rather than concern for lasting food and nutrition security.

With most countries in the Asia-Pacific Region concentrating on export of value-added goods and services, Bangladesh is also in a position to benefit from its agricultural potential and become a major supplier of food, especially for the benefit of the ethnic population of Bangladeshis living outside Bangladesh. In order to realize this potential, however, we must understand and adopt the relevant socio-economic matrix for sustained prosperity and evolve a planned approach towards agricultural management for sustaining food and livelihood security.

**China**

Mr. Zuo Mengxiao said that diversification of farm crops basically refers to the diversification of crop species and the diversification of farmland ecosystems. He further elaborated that crop diversification refers firstly to the change of crops and secondly to the change of varieties and cropping systems as well as to higher cropping intensity. China is one of the three centres of origin of cultivated plants in the world and has a great quantity
of wild kinds of cultivated plants such as soybean, rice, barley, tea and others. Therefore, China is very rich in crop germplasm resources.

The Chinese Government is giving due attention to agricultural production and promotes helpful policies in rural areas; this has resulted in sustained and stable growth in the production of major crops. The cultivation of farm crops occupies a very large area. The contribution of cultivated crops to the Gross Domestic Product (GDP) and domestic commodity trade is quite significant. However, with the development of the economy and the improvement of the living standards of people the proportion of output value of crops in the GDP shows a declining trend.

Great importance is also attached to the development and protection of agricultural resources. Similarly, attention is focused on guiding and encouraging farmers to adopt the market-oriented cropping structure, expanding the employment of the farmers and enhancing their income. The Government also emphasizes that protecting arable land, saving water and developing and using the agro-resource environment rationally is the base for ensuring national grain security, and achieving sustainable development of agriculture as well as preserving the diversity of crops and ecology. With the increase of the population, improvement of people's living conditions and decrease of the area of arable land, enhancing the yield and quality of crops will be the primary task facing China’s agriculture.

China has made very good advances towards crop diversification. A substantial acreage has been changed to higher value and more profitable crops. The most impressive achievement has been the change of varieties in staple food crops, which has helped the country to increase production and productivity tremendously. Spectacular gains in productivity have been achieved in China over the last 25 years mainly through the adoption of rice hybrids. As a result China managed to export 3.7 million tonnes of rice in 1998, the highest record since the founding of the People's Republic of China, inspite of the fact that the Area Growth Rate during the last decade (1989-1999) was negative (-0.5 percent). Moreover, impressive achievements have been recorded with other cereals such as maize; and wheat and barley, the imports of which declined by 20 percent in 1998. Similarly, cultivation of three crops a year is something which is widely practiced now in the country. Intercropping and multiple cropping are also practiced extensively.

The Government, therefore, continues to support crop diversification in the country and relevant rules and regulations aim at promoting crop diversification in a sustainable manner.

India

Dr. C.R. Hazra stated that crop diversification is advocated for reaping the gains of complimentary relationships or equating substitution and price ratio for competitive products. Crop diversification may also be used as a risk precaution and to stabilize farm income. Changes in cropping patterns in favour of non-food crops are often suggested as a means of rapid employment and income generation in India. The growth and development of agriculture have a significant impact on income and employment. This not only leads to higher employment generation through 'on-farm' activities but also has
an indirect contribution towards increased 'off-farm' activities and employment generation induced by raising agricultural income, decreasing relative prices of foodgrains and improving food security.

Because of continuous land fragmentation, the size of land holding is continuously on the decline. Consequently, there is also decline in family income, especially in the case of small and marginal farmers. The current trend in cropping patterns clearly indicates a shift from coarse cereals like sorghum, pearl millet, small millets, barley etc., to superior cereals like rice and wheat. There is also substantial diversification of the cropped area from coarse cereals to oilseed crops because of governmental policies and pricing mechanisms. The share of total oilseed crops increased from 10 percent in 1980-81 to about 14 percent currently. Amongst oilseeds, the major gainer in area is soybean followed by rapeseed, mustard and sunflower. There is also a decline in the area coverage of jute and other allied fibres. Apart from oilseeds, there is a significant area increase of fruits and vegetables, including spices. The share of area increase in vegetables is primarily due to increase in the area of potato and onion. The sugarcane area has also substantially increased over a period of time because of increased irrigation water availability, governmental policies and price support mechanisms.

The cropping pattern changes have occurred mainly from crops with declining demand and lower value addition potential to crops with an increasing demand and higher value addition potential. Market responsive Indian agriculture has now evolved to usher in its next stage where growth originates more and more from crop diversification and value added production. The focus of agricultural growth has since shifted from the production front to the processing and marketing front. A greater share of agricultural investment has now to be directed to expand and strengthen the infrastructure and institutional foundation of Indian agriculture so necessary for value added growth. Infrastructure components such as modern processing and cold storage that can support oilseeds, fruits, vegetables and other horticultural crops, deserve top priority. As Indian agriculture is sooner or later going to reach the ultimate limits of its traditional sources of growth such as additional area, irrigation expansion, and farm technologies, the institutional and infrastructure factors have now become indispensable to enhance and sustain agricultural growth.

The increasing responsiveness of Indian agriculture to price factors suggests the emerging importance of agricultural pricing policy as a signaling instrument for guiding area allocation and crop diversification in time with the changing demand and supply relationships of agricultural commodities. Such a signaling role of price policy is going to become still more important in the emerging context of trade liberalization in the global agricultural market, since both the area elasticity and average response of crops vary considerably with respect to two prices, i.e., the crop grown and that of competing crops. The policy of fixing support prices for a given agricultural commodity has to give due consideration to the cross price effects on area allocation. In the case of most crops it is the price of competing crops that have a dominant effect on the area response of crops. The turn-around achievement in the oilseeds sector also demonstrates the effectiveness of a well-designed crop development programme, especially when implemented on a mission mode. Although the price-induced area shifts have helped in the expansion of area under oilseeds, especially in the rainfed belts of Central and Western parts of India, the real breakthrough in oilseeds production and productivity has occurred mainly through the impact of the Technology Mission on Oilseeds. Because the mission has integrated
various disjointed programmes for oilseed development with a common thrust and exploited the conducive incentive environment well, it has become the most successful programme of crop development pursued in India to date.

**Japan**

Dr. Masa Iwanaga reported that during the post-war era, Japan has experienced a drastic change in its economic status and in the role of agriculture in the society. Japan’s economy has grown to the second largest in the world. This change has been accompanied by social changes in the area of agriculture and food systems in Japan. For example, grain self-sufficiency ratio on a calorie basis declined to 40 percent in 1998. This is the lowest among the OECD member countries. The relative importance of agriculture as an industry has also declined. The agricultural population represented only 4.5 percent of the total population in 1997, significantly down from 13 percent in 1961. Rice consumption declined to 65 kg per capita/year in 1998 compared with 118 kg in 1962. These changes are major driving forces in crop diversification efforts in Japan.

One of the major factors behind this declining trend in self-sufficiency ratio is a fundamental change in Japanese dietary patterns, as reflected in the increasing consumption of animal products and fats and oils, which are largely dependent on imported feed grains and oilseeds, due to the constraints on expansion of agricultural land and ever decreasing rice consumption. Japan is the largest importer of foods and agricultural products in the world. In 1998, Japan spent 7.5 trillion yen (approximately 70 billion US dollars) for food imports. Food items constitute about 21 percent of all imports to Japan.

The main struggle that Japan has faced within the post-war era is rice production. Rice is the staple food in Japan and having a sufficient rice supply was the main objective at household and national levels for some years after the Second World War. Improvement of cultivation techniques and adoption of improved cultivars, together with governmental policies, allowed Japan to meet its rice demand needs. However, change in life style and social structure, driven by drastic economic growth, has resulted in a decrease of rice consumption since the mid-60’s. Consumption of bread and noodles increased due to people’s interest in diversified diet at the expense of rice consumption. The current and future challenges for crop diversification efforts in Japan include: a) stabilization of rice cultivation and production, b) promotion of wheat, soybean and feed crops through technical development, c) further development of the linkage between food industry and agriculture, and d) promotion of varietal diversity in food to meet and create new demands in the changing society. The recently introduced Basic Law on Food, Agriculture and Rural Areas provides a coherent and forward-looking policy and framework to achieve goals of food security, rural development, promotion of the multi-functionality of agriculture and international cooperation.

**Malaysia**

Tunku Mahmud Bin Tunku Yahya informed the participants that crop diversification is being practiced in Malaysia. Traditionally, horizontal diversification or the cultivation of an increasing number of crops as opposed to one or two major crops is
the practice. Vertical diversification that refers to the upstream and downstream activities of a particular crop or crops is also being practiced. Oil palm, rubber, cocoa and rice have been and continue to be the major crops grown by the private and public sectors. However, other crops such as coconut, tropical fruits, vegetables, flowers, annual crops etc., are being grown by small-holders and the private sector.

The contribution of the agricultural sector to GDP, employment and export earnings are on the decline. In 1975, the contribution of agriculture to GDP was 28 percent but in 1995 it had gone down to 13.6 percent. In 1975, the contribution of agriculture to employment was 37 percent but declined to 18 percent in 1995. The contribution of agriculture to export earnings in 1975 was 50 percent and in 1995 it was only 13.1 percent.

A provider of food will continue to be the role of agriculture in Malaysia. The eight major granary areas have been reserved for rice cultivation where new varieties or new technologies from research and development (R and D) work can be adopted. The agriculture sector through crop diversification can be the provider of high quality raw materials to the industrial sector for agro and resource-based industrial development. The cluster-based agro-industrial development as identified in the Second Industrial Master Plan (IMP2), 1996-2005, seeks to strengthen both inter and intra-sectoral linkages including the development and expansion of intermediate and supporting industries.

There are many challenges facing the agricultural sector in general and crop diversification in particular. Firstly, there is a need to reduce labour requirements in agriculture. Secondly, there is a need to maximize land utilization. Land for agricultural activities is becoming more limited due to conversion for other uses such as industrial, residential and urban uses. There is a need to strengthen the competitiveness of Malaysian agriculture. There is a need to enhance private sector investment in food production. Total private investment in agriculture during the 1990-95 period was only RM9.5 billion as compared to RM84 billion in manufacturing. The small-holders need to be transformed into a more commercial sector. Efficiency gaps are still substantial between the small-holder and estate sector.

There are tremendous opportunities for downstream activities such as minimally processed fruits, tropical fruit juices, natural food ingredients, functional food, modified food ingredients, health food, convenience food, frozen fruits, beverages and high fibre products. The changing consumer tastes for environmentally friendly goods or pesticide free goods open the door for organic farming or the soil-less culture technique of production. Precision farming through the use of advanced technologies such as remote sensing, Geographical Information System (GIS), Global Positioning System (GPS) and Decision Support System (DSS) must also be given due consideration.

The prospects for rice look good because the demand for rice in both international and domestic markets is expected to increase. The prospects for growth of the fruit industry are bright due to the expected increase in domestic consumption of both fresh and processed fruits and expanding world demand for tropical fresh and processed fruits. There are prospects for Malaysia to concentrate on the production of high quality fresh vegetables for both domestic and export markets and also on a few selected vegetables for processing.
The Third National Agriculture Plan (NAP3) 1998-2010 has an overriding objective of maximizing income through optimal utilization of resources in the sector. This includes maximizing agriculture’s contribution to national income and export earnings as well as maximizing income of producers. NAP3 will continue to pursue agricultural growth through moderate expansion of land and further intensification of land use.

Crop diversification will continue to be practiced in Malaysia. Malaysia started with horizontal diversification, and is now moving towards vertical diversification. A balanced development strategy between the various sectors of the economy is important to avoid a wide disparity in income, reduce poverty, promote good infrastructure development and utilities, and ensure better homes and quality of life.

**Nepal**

Mr. K.C. Sharma explained that Nepal is divided agro-ecologically into three regions, namely i) Terai or plain region, ii) Hilly region, and iii) Mountain region. In the Terai region the climate is tropical and sub-tropical in nature; in the hills, it is of sub-tropical and temperate nature; and in the mountains it is very cold and there is snow. The climatic conditions prevailing in each locality determine the types of commodities to be grown.

As Nepal has a variety of climatic conditions, a wide variety of crops can be cultivated. Many off-season crops can be well initiated for commercialization. Diversification as understood in Nepal is the growing of alternative crops and varieties as well as the change of the cropping pattern, provided there is a comparative advantage. The identified new crops are incorporated into the cropping system which is based on major staple food crops, mostly rice-based cropping system in the lowlands and maize in upland areas.

Agriculture, being a complex enterprise, requires an integrated approach from concerned line agencies. Ultimately, it is the farmer who decides what to grow. His decision depends on several factors including the attributes of advocated technologies. A subsistence farmer has one type of outlook while a commercial farmer has a different one, the former being confined to hand-to-mouth problems and the latter looking beyond these. Usually, the subsistence farmers or small farmers or marginal farmers are oriented towards a household demand driven production system, whereas the commercial farmers or big farmers look towards a market and technology driven production system.

But with the introduction of pocket areas and the farmers group approach, even the small and marginal farmers can be included in the groups and go for commercialization. They can start group production and a group marketing system in the pocket areas. In this way, the pocket area farmers are very much inclined towards diversifying their cropping systems with a view to selling their produce locally or externally, depending upon the volume of the produce.

The Agriculture Perspective Plan (APP) is the main strategy document that gives a working framework for agriculture. In order to boost production, certain priority areas, priority inputs and priority commodities have been identified. Irrigation, agricultural roads
and electrification should go together with extension, research, inputs and credit in identified pockets, depending of course upon the level of commercialization of the pockets.

The import-export figures of agricultural commodities are very small. But, with the emphasis on crop diversification these figures can be changed substantially. It is a fact that Nepal's major external market is India where the production cost of almost all agricultural commodities is low compared to that of Nepal, and therefore it is difficult for Nepalese farmers to compete with Indian farmers. As a result, large quantities of agricultural produce enter into Nepal, particularly from the border cities. In this context, there is a need to introduce and promote off-season commodities with a view to Indian markets. The vegetables grown on the hills would be off-season vegetables for the plains of India. There are some important species of spices (garlic, coriander, and cardamom) that might have high demand in India or other countries. These species will be given due consideration in the crop diversification strategy.

To promote commercially profitable new crops, women's participation is necessary, while NGO and private sector involvement and integrated efforts should be taken into account. Farmers should be well connected with communication systems to know the trend of markets (both internal and external) so that they can develop their production system accordingly. Along with this, there is a need to promote pocket areas and the farmers group approach, joint workshops on regular basis, technical and managerial training to pocket area farmers, and effective extension services. Also, inter-group relationships should be established in order to strengthen the groups. Capacity building of farmers groups would help make the groups independent. In these efforts, trade liberalization also needs to be taken into consideration.

**Philippines**

Prof. Rene Rafael C. Espino pointed out that over the years, the agriculture sector has been a major player in the Philippine economy. With changing national and global trends, the sector has identified new strategies and programmes to become more competitive. A strategy that has helped to alleviate poverty and increase productivity and competitiveness is crop diversification. The passage by the Philippine Congress of the Agriculture and Fisheries Modernization Act of 1997 is a giant leap towards reaping the benefits of previous efforts of both government and private sectors on crop diversification.

The Department of Agriculture (DA) is the government agency responsible for the agriculture sector. Several agencies under the DA helm, which are strategically located, are implementing crop diversification projects.

The majority of agricultural land is devoted to the two staple crops, namely, rice and maize. However, in recent years, the area devoted to these crops is on the decline. Other important crops include coconut, banana, sugarcane, mango and pineapple.

There are two perspectives of crop diversification in the Philippines. One is planting alternate crops after the main crop. The other is planting one or more crops in-between a perennial crop. The emphasis of the former is on rice while the latter is on
coconut. This is so because crop production areas in the country are mainly devoted to these two important crops. Furthermore, Government resources through the years have been largely allocated to these crops, and such cropping strategies have been documented.

Among the successful rice-based cropping patterns are rice-onion, rice-garlic, rice-peanut, and rice-mungbean. In coconut-based system, the more successful are coconut + cacao, coconut + passion fruit, coconut + banana, coconut + pineapple, and coconut + pineapple + cacao + banana. These cropping systems are well documented and information materials are readily available.

There are other cropping patterns practiced in some areas, e.g., maize-legume and maize-root crops; however, these are not fully documented. There are various factors that affect crop diversification in the country. These are the biotic (soil and kind of crop), environmental (climate), socio-economic and institutional factors.

Socio-economic issues are hinged on profitability of cultivating crops other than the traditional crop, availability of markets and stability of farm gate prices. In many areas of the country, cultivation of cash crops after rice or as an intercrop in coconut areas provided farmer-adopters higher incomes. On the other hand, institutional factors include availability of irrigation water, level of government support, farmer participation, and land tenure. Of these, non-availability of irrigation water has been a driving force towards crop diversification.

There are four important government policies that directly or indirectly affect crop diversification in the country. These are pricing policy, tax and tariff policies, policies on public expenditure and agrarian reform. On pricing policy, the price support for rice was reduced and marketing is already being done by the private sector. Tax and tariff policies were adopted to eliminate import quotas and minimize the number of permits required for importation and lower the tariff level. Increased investments on R and D and other rural infrastructure facilities are already underway. Much has been achieved, likewise, in the land reform programme.

There are a number of crop diversification programmes currently implemented in the country. The Philippine Coconut Authority has a nationwide programme entitled “Maunlad na Niyugan Tugon sa Kahirapan” (Progressive Coconut Farming Towards Poverty Alleviation) which involves replanting, fertilization, general farm assistance, R and D and provision of extension services. On the other hand, the campaign for crop diversification in rice areas, especially in rainfed areas, is a continuing effort of Philrice and other institutes.

In general, past, present and future crop diversification projects in the Philippines have largely depended on the active participation of the private sector with the Government providing technical and infrastructure support. Future programmes on crop diversification include the World Bank-assisted project entitled “Small-holder Tree Crops Development and Diversification Project”. The Department of Agriculture is currently negotiating the grant from the said agency.
Sri Lanka

Mr. L.A. Weerasena stated that Sri Lanka is a developing country with a population of 19 million and a per capita income of US$829. Sixty two percent of the Sri Lankan population is involved in agriculture. The irrigable land extent of the country has increased tremendously during the past four decades due to the commissioning of several major irrigation schemes. Technological achievements that have taken place simultaneously with the increasing cultivable land extent predict saturation in rice production. This, along with other concepts of efficient water use, cultivation of crops depending on the land capability, and favourable government policies, led to attractive market prices which collectively contributed towards the success of crop diversification programmes of the island.

A formal crop diversification programme was primarily started in major irrigation schemes where 80,000 hectares of well-drained lands were available for implementing this concept. Crop diversification subsequently followed in other sectors such as in minor irrigation schemes, and rice lands in the up-country, mid-country and low-country intermediate zones. The marginal plantations of tea and rubber were also diversified due to economic reasons. Finally, diversification programmes were launched in the rice lands in the wet zone. Crop selections in these systems are decided based on the adaptability to the agro-ecological conditions, market prices and crop duration. The most important food crops that are cultivated in crop diversification programmes are chilies, onion, shallots, vegetables, root and tuber crops and pulses.

Diversification programmes improve the food security in some of the essential food commodities in the island. Crop diversification generates higher incomes for the farmers and provides more employment during the season. Such programmes would ensure the ecological balance and favour the environmental protection concerns.

Irrespective of the success of several crop diversification programmes, certain constraints need to be tackled. The lack of tolerant varieties for excess moisture conditions, cost of land preparation in rice and non-rice cropping patterns are the major physical barriers. Insufficient number of candidate crops of short duration is another major agronomic constraint, while poor knowledge and expertise regarding alternative crops and the preference of growing rice by the farmers can be identified as the major social constraints. High cost of production and the lower market prices trouble the farmers engaged in diversification. The rise in wage rate is considered to be one of the main factors for the high cost of production. This situation was further aggravated by the trade liberalization, which relaxed the import restrictions.

Reduction in the cost of cultivation and development of new adaptable varieties are the challenges directed at the researchers. The receding Government involvement in marketing, seed production, technology transfer and extension creates a void in the institutional support and this might have to be rectified by creating an information system facilitating farmers in decision making. Although farmer organizations have been formed at various levels, the present level of activity is totally inadequate for an efficient and effective diversification programme. Infrastructure improvements in technology transfer, communication and agro-based processing have to be further developed in relevant areas.
Although the policies during the past were conducive for crop diversification, the trade liberalization policy has hindered progress in some of the crop diversification programmes, especially in the food crop sector. Other socio-economic factors are the introduction of new crop varieties that catch high market prices and give local farmers a competitive edge to shield them from cheap imports. Other social factors would include ironing out disputes on land ownership and development of infrastructure facilities for handling agricultural produce and processing for further improvement of crop diversification programmes.

**Thailand**

Mr. Chavalvut Chainuvati indicated that the continued high growth rate of the non-agricultural sector had an adverse impact on the agricultural sector. The proportion of per capita income of farmers who are engaged in agriculture was 13 times lower than the income derived from the non-agriculture sector. Besides, the agricultural production output is relatively low because the production depends mainly on rainfall as only 17.5 percent of total cultivated land is under irrigation. The small farmers have farm holding size less than 3.2 hectares which is usually situated in non-irrigated areas.

In order to raise the household income and quality of life of farmers, there is a need to improve the production system to make it more effective and competitive in line with the available natural resources, market demand and readiness of farmers to accept changes. This can be done by providing the farmers with alternatives with regard to crop species and varieties for market opportunities, taking into account their readiness for restructuring their production systems. Changes in the cropping pattern as well as higher cropping intensity need also to be considered.

Crop diversification in Thailand aims at improving the socio-economic conditions of the farmers in the rainfed and irrigated areas. Rice is the most important food crop in the country. Other major crops grown are maize, cassava, sugarcane, rubber, oilseed crops, fruits, vegetables and others. The principal export crops are rice, cassava, rubber, fruits, vegetables, flowers and some others.

Due to the low profitability of the rice crop, farmers are keen to introduce other crops along with rice to increase their income. Those areas which are not very congenial for rice production are being diverted to other crops. On the other hand, the Government is keen to maintain or even increase its share of rice export in the world market and also maintain the current level of rice availability for domestic consumption. For this, it has planned to increase the rice yields, which are currently rather low.

While maintaining recent trends of rice production through increased productivity, there is an increasing interest in diversifying towards cultivation of soybean, mungbean, vegetables and other high-value crops. Part of the upland rice area has already been diverted to fruit production (longan, lychee, durian, mangosteen, etc.). A Royal Project of His Majesty the King in the northern hills has encouraged the hill tribes to replace opium poppy cultivation with selected vegetables, fruits, flowers and other high-value crops. Moreover, short duration crops before or after the main economic crops are recommended. In addition, groups of farmers are encouraged to grow particular crops
and varieties justified by market demand in selected agro-ecological zones through cooperative investment.

A new initiative towards diversification is the so called "New Theory" of His Majesty the King which is a novel approach and concept aiming at proper management of land and water resources to create optimum benefits for farmers who own a small piece of land. An integral part of this programme is the division of land into 4 parts; one for a pond to store water, one to be used for rice cultivation, one for growing fruits, vegetables and other crops, and the last to be reserved as a place for housing, livestock raising and other purposes.

Whether alternative proposals by the Government will be accepted or not depends on the incentives provided, and understood by the target farmers. In viewing the alternative proposals in economic terms, the farmers will consider whether the income generated by the alternatives is higher than the traditional one or not. As to the social aspects, an alternative plan may or may not be suitable for their farm resources in terms of land, labour and capital available. That means market and farm resources are the main factors influencing the decision-making. The farmers will not accept alternatives if they cannot see a market opportunity; also, they will consider whether the land, labour and capital they have are suitable and appropriate for diversification.

**Viet Nam**

Prof. Nguyen Van Luat said that crop diversification as understood in Viet Nam is defined as the strategy of shifting from less profitable to more profitable crops, change of variety and cropping patterns, increasing exports and competitiveness in both domestic and international markets and protecting the environment. Rice is the most important food crop in the country. Non-rice food crops cover only 15 percent of the total food crop production. The total growing area of rice amounts to 7.6 million hectares (1999). It is necessary to reduce the area under rice for crop diversification in order to get higher incomes and ensure sustainable agriculture. Two main approaches should be applied to enhance crop diversification: a) to increase trade value of crop products by growing more profitable crops and adding value through processing; and b) to educate farmers in improving their nutrition by introducing into their diets non-rice food crops rich in protein, oil, vitamins and minerals.

The most important constraints hampering crop diversification in the country are high input costs for production and low product quality because of application of low-level technologies, thus inducing low benefits. It is necessary to introduce into the production system not only high-value crops and improved varieties, but also better agro-techniques that can economically and effectively exploit the potential of the new crops and varieties.

Farmers in the Mekong Delta enjoy favourable conditions for practicing crop diversification integrating agriculture, fisheries, forestry and livestock. Because of annual flooding experienced during the rainy season and droughts in dry seasons, farmers have resorted to the ditch and dike system of farming in their fields, making dikes as a preventive measure to avoid submergence of their crops. Pipes are also laid through the dike to take water with silt and useful aquatic fauna, and to facilitate drainage, leaching
decomposing acidic organic matter when necessary. On the dikes, they plant many crops, feeding fish and/or shrimp in canals, with rice as the main crop grown in the field. Before floods become imminent, they harvest rice and fish from their fields. When the floods recede, fish colonize the canals once again and a second rice crop will then be planted. Farmers have to minimize chemical use for the safety of fish/shrimp in canals and poultry and pigs living on dikes.

Some advanced techniques of rice farming are being currently practiced in all rice growing areas of the country. Row-seeding using the improved IRRI Seeder is now popular for rice in the Mekong Delta. There are at present about 3.5 million hectares where they apply the broadcasting method with very high seed rates of 200-250 kg/ha and sometimes even higher. Row-seeding, which is replacing broadcasting, has been applied on thousands of hectares in all 12 provinces of the region. Results show that application of the row-seeding method can save at least 100-150 kg of rice seed/ha, making better conditions for feeding fish or ducks in rice fields, and decreasing damage by rats and pests, while this method has increased paddy yield by as much as 20 percent. Use of very short duration rice varieties (80-90 days) has reduced crop duration in the field in order to escape from floods in the wet season, and drought and saline intrusion in the dry season; also, it has been beneficial for crop intensification. Many such short duration varieties (named ‘OMCS’) have been released over nearly a million hectares. The results from research and production demonstrate that the very short duration rice varieties (80-90 days) can grow and yield normally; many of them can yield 7-8 tonnes/ha with high grain quality and resistance to many pests and diseases.

There have been several State interventions, action plans and policies which support crop diversification and agricultural development in general. These include new policy on marketing, on agricultural tax and on credit and programmes for poverty alleviation, creation of job opportunities, agro-forestry, ‘greening’ of degraded lands, inputs for transportation, provision of irrigation facilities and other infrastructure. In addition, programmes are in place for re-organizing and increasing financial aid for agricultural research institutes as well as improving agricultural extension organizations and services.

V. INTENSIFICATION OF CROP DIVERSIFICATION IN THE ASIA-PACIFIC REGION

Prof. H.P.M. Gunasena stated that most of the countries in the Asia-Pacific Region depend on agriculture for their economic development. Hence, their agricultural sectors focus on food production, gainful employment, foreign exchange earnings, capital accumulation and labour replacement.

Many of these countries are moving towards industrialization due to their open economic policies resulting in a gradual shift in the population from agriculture to the industrial sectors. The agricultural population in the developing countries of the Region has declined from 66 to 62 percent and in the developed countries from 7.6 to 7 percent from 1988-1997. This shift has two major repercussions on crop diversification in the Region. These are the high cost and non-availability of labour in the cultivation seasons. As cost of labour is escalating, there is a need to develop less labour intensive crop production technologies.
Although crop production can be increased by expanding the cultivable area, this option appears to be marginal, even with heavy investment. It is also noted that the land to man ratio is declining rapidly in the Region and presently stands at 0.25 hectares. In the future, increased food production has to be achieved through increasing yield per unit area and by crop intensification. It is estimated that 75 percent of the production increases will arise from the improvement of yield of crops, and the balance from increases in land area and cropping intensities. Therefore, the development of appropriate crop production technologies will be essential.

Crop diversification is a useful means to increase crop output under different conditions. It should be approached in two ways. The commonly understood mechanism is the addition of more crops to the existing cropping systems, which is the broadening of the base of the system. This method of horizontal diversification has special significance under small-holder production systems and has been responsible for production increases due to high cropping intensities. The system of multiple cropping has been able to increase food production potential to over 30 t/ha with an increase of the cropping intensity by about 400-500 percent. The other type is vertical crop diversification which reflects the extent and stage of industrialization of the crops. It has to be noted that crop diversification takes into account economic returns from different crops, and is different to the concept of multiple cropping. Both types of diversification will be essential to improve crop yields and income generation at local, regional and national levels.

The major constraint in the Region is low productivity coupled with high population pressure and negligible area of land available for expansion of cultivation. Therefore, under such circumstances, the available option is intensification of crop diversification using more modern technologies. These will include balanced crop nutrition, agricultural mechanization, irrigation, use of improved seed and other planting materials, and use of new technologies such as protected cultivation and organic farming. In crop diversification aiming towards sustainable production systems, far greater emphasis should be given to farmer participation in adopting and implementing new technologies. Often crop diversification efforts have failed due to ignorance of farmer involvement and external and internal factors that effect the system. New technology development will enhance crop diversification. The development and utilization of technologies should be supported at national levels through appropriate policies, capacity building and effective implementation mechanisms.

VI. UNCTAD'S PROJECT ON CAPACITY BUILDING FOR DIVERSIFICATION AND COMMODITY-BASED DEVELOPMENT

Mr. Alexei N. Mojarov reported that the international community has recognized that horizontal and vertical diversification by commodity dependent developing countries is a priority for their development and invited the United Nations Conference on Trade and Development (UNCTAD) to provide assistance to developing countries in this respect. Starting from 2000, UNCTAD is embarking upon a two-year Project on Capacity Building for Diversification and Commodity-Based Development. In charge of the Project is UNCTAD’s Commodities Branch of the Division on International Trade in Goods and Services and Commodities (DITC).
The Project’s objectives are: i) to promote the horizontal, vertical and geographical diversification of production and trade structures; ii) to improve governments' capacities to formulate focused, effective and sequenced policies in this respect; iii) to increase the competence of enterprises in adapting their business strategies and supplies to the Post-Uruguay Round trading framework; and iv) to strengthen positive linkages between the commodity sector and the rest of the economy.

Within the framework of the Project the following activities will be carried out:

a) Preparation of policy oriented studies on export diversification strategies of governments and enterprises, and on development implications of diversification for the exchange of experiences and capacity building.

b) Regional workshops for enterprises and government officials, focusing on export diversification strategies of governments and enterprises, and on development implications of diversification.

The workshops will be organized in the four developing regions, namely Africa, Asia, Latin America and the Pacific. These workshops, where not only regional experiences but also those from other regions will be discussed, will provide the framework for national as well as regional or sub-regional capacity building programmes. The regional workshops will be followed by national workshops expected to be held in 10 countries covering developing regions. The national workshops will bring together the government, the enterprise sector, civil society and relevant international organizations to make proposals on enterprise strategies as well as the most efficient and cost-effective government policies and measures, including those aimed at improving physical and human capacities to promote diversification and to ensure that the disadvantaged segments of the society benefit from diversification, taking into account administrative requirements, sustainability concerns and the social and human context.

The regional workshops for Asia and the Pacific will be organized by UNCTAD in close cooperation with the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). The workshop for Asia is tentatively scheduled for February-March 2001 to be held in Bangkok.

VII. ALTERNATIVE CROPS AND CULTIVARS FOR NEW OPPORTUNITIES

Dr. Mahmud A. Duwayri elaborated on the "Alternative Crops and Cultivars for New Opportunities", which is one of the Programme Entities/Projects of the Crop and Grassland Service of the Plant Production and Protection Division of FAO. Referring to the rationale of the Entity/Project he mentioned that there are about 150 crop species which have already received attention from breeders and commerce and have evolved through human intervention into widely cultivated species. Of these, 10-15 produce half of the world's food and materials. This evolution is, understandably, led by the nations with the most resources and is basically for their own and more stable high input and often subsidized systems. Novel technologies in emerging crops, cultivars, protected agriculture and cropping systems need to be made available to and tested in developing countries, where farmers have a need for stabilization of their specific agro-environments
particularly through establishment of suitable species and high-value cultivars with food, feed, fuel, fiber and pharmacological potential. The identification of alternative crops and improved technologies would aim at providing a comparative advantage within a given agro-ecological and socio-economic context. Sustainable intensification of agriculture without further degradation of natural resources remains a challenge.

Risk reduction through diversification (related to climatic and biotic vagaries, particularly in fragile ecosystems and commodity fluctuations) by expanding locally adapted or introducing novel varieties and related production systems, will contribute to improved food security and income generation for resource poor farmers and protect the environment. Small family farms will not be able to increase their total income to acceptable levels with the production of staple food crops as these are invariably of low value for the farmer/producer. To increase income the farmer needs a higher value product that can be obtained by adding value to primary or secondary products. Fruits, vegetables, herbs and spices, flavourings, natural colourants, medicinal plants and others all offer an opportunity for farmers to produce higher value products. Nevertheless, introducing new crops on their own is unlikely to be successful as the whole technological and commercial package needs to be introduced at the same time. Hence, this technical project is based on the introduction of alternative crops with production, processing, marketing technology and nutritional information. The project is closely related to the Special Programme on Food Security as 80 percent of the world’s poor live in fragile ecosystems. FAO's multidisciplinary approach and global networking capacity can identify and match new crops and novel cultivars and their production systems to targeted iso zones and their peoples for both extensive and intensive applications. A continuing review of technology advance in existing and “new” crops is a pre-requisite and has to be based both on indigenous and international knowledge.

The objective of the Project is the broadening of the crop and cultivar knowledge base for better use of the plant density in support of crop diversification options into targeted eco-zones in relation to food and income security targets and market opportunities.

The major outputs are:

a) Integration of fragmented knowledge on lesser-known plants with localized and/or international potential as crops.

b) Assessment and promotion of high-value crops for distinct agro-ecological environments.

c) Introduction to and expansion of palms to Africa.

d) Technology transfer for integrated greenhouse crop production and protection management.
VIII. CONCLUSIONS AND RECOMMENDATIONS

1. The Consultation recognized that crop diversification is one of the best options to increase farm income leading to food, nutrition and ecological security as well as poverty alleviation in the Region. Therefore, greater attention should be paid to crop diversification by the governments of the Region. Crop diversification could be approached in two complementary and interactive ways; a) horizontal diversification through expanding the crop base by substituting or adding more crops into the cropping systems as commonly practiced by many countries of the Region; and b) through vertical diversification in which downstream activities are undertaken to add value, indicating the stage of industrialization of the crops and their economic returns. Vertical diversification is complementary to horizontal diversification, and the opportunities should be exploited for product diversification and value addition to achieve highest economic returns.

2. Efforts have been made by different countries to identify high specialty crops, new crops, off-season varieties and production systems, and novel varieties of crops with comparative advantage, mainly fruits, vegetables and ornamentals, to open up new opportunities for farmers. It was noted that the promotion of multipurpose species would also be useful for diversification of agro-processing on small scale at local/national level for productivity enhancement and expanded employment opportunities.

3. Rice is the most important crop in Asia. However, in marginal areas, rice-based cropping systems have relatively low returns. Improving the current cropping systems to enhance their sustainability to the extent possible, and shifting marginal areas out of rice into other more profitable crops is seen as a solution. Alternatively, flexible cropping systems for upland farmers that feature production of more income elastic goods like horticultural products are a means of diversifying their income sources.

4. Concerns have been expressed regarding the policies of some countries to reduce the extent of land under major perennial crops and rice; and subsequent repercussions of these will have a long-term bearing. It was noted that such crop replacements unless carefully analyzed might have adverse effects on the food and industrial product supply in the Region.

5. The need for improved seed and other planting materials for effective crop diversification was recognized. The production of quality seed through national seed programmes and efforts of many countries towards hybrid seed development was noted. The Consultation recommended the strengthening of National Seed Enterprises and promotion of private seed industries to supply quality seed and other planting materials which is so vital for crop diversification. Steps should be taken to maintain effective national and sub-regional seed security in the Region through regional collaboration.

6. The high post-harvest losses of crop produce particularly in horticultural crops which annually account for 20-40 percent in most countries, if prevented, could increase yield by similar amounts. It was recommended that efforts should be made to minimize such losses. The development of links with the food industry
for product diversification and value addition to meet the demands of the changing society was recommended.

7. Serious concern was expressed of the soil fertility depletion, due to continued intensive cropping over long periods of time, which needs to be corrected. The use of organic manures as replenishments through direct application or crop rotations and insertion of green manure crops and other food legumes in the cropping systems was recommended.

8. Due to the impending labour shortages for agriculture, the need for mechanization of field and post-harvest operations was noted. Need for mechanization of agricultural operations and assessment of the machinery use by the agricultural sector of countries of the Region was emphasized. In view of limited land, water and labour supply, the need for adoption of emerging agricultural technologies such as protected agriculture, organic farming, Integrated Plant Nutrient System (IPNS) and Integrated Pest Management (IPM) was emphasized. Efficient input supply systems through micro irrigation and fertigation should be encouraged.

9. The role of the private sector in the development of modern agro-enterprises to infuse capital and technology into diversified cropping systems for effective commercialization for long term sustainability was advocated.

10. The importance of diversification to value-added export oriented crops was emphasized. In that context, the need to study marketing opportunities and product standards required by importing countries, as well as price fluctuations, competitiveness etc., prior to embarking on diversification, was highlighted. Furthermore, the availability of market information was considered essential for identifying promising external markets. In general, there is no point in diversifying into a crop for which market potential is limited.

11. Individual countries have developed policies, strategies and implementing mechanisms for crop diversification. These include infrastructure development (transport, communication and markets), pricing policies, subsidies, insurance schemes, tax, tariff etc., in order to minimize risks and safeguard the interests of agricultural entrepreneurs. As the strategies adopted by different countries are innovative and diverse, sharing of such information will benefit the other countries to stabilize and sustain their crop diversification initiatives.

12. The governments role in recognizing farmers participation in the total process of crop diversification, provision of information on new crop varieties, technologies to be used, potential yields, marketing avenues and incomes to be realized was essential for the development of successful crop diversification programmes. The need for skill development and capacity building and documentation of required information through the production of field manuals, extension leaflets etc., for use by the entrepreneurs was also considered essential.

13. Significant changes are taking place in domestic and international demand for crop products due to improvement in income, better standard of living, and changing life styles and preference patterns such as improved horticultural and livestock products. Trade liberalization and development of transport and
communication infrastructure have opened more avenues for trade and have improved access to new and distant markets. This has created new opportunities for crop diversification in various countries.

14. The role of FAO as facilitator in the development efforts of crop diversification undertaken by different countries, through holding of seminars and workshops, skills development programmes, information sharing, facilitating germplasm exchanges etc., was recognized. The need for the development of an Information Data Base on crop diversification for use by policy makers, farmers, consumers, and other stakeholders was an essential requisite for crop diversification. It was recommended that efforts should be made to compile this data-base.

To facilitate all the above-mentioned activities the establishment of a Network on Crop Diversification for the Region was recommended.

15. Recognizing crop diversification as an element of poverty alleviation, income generation, equity and natural resource conservation, and to enhance this, a well designed mechanism has to be developed through the participation of international organizations and local governments to strengthen the initiative undertaken by this Region.
ANNEX 1

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ANNEX 2

AGENDA

1. Opening Session
2. Country Reports
3. Regional Report
4. Specific Reports
5. Recommendations
PROGRAMME

Tuesday, 4 July 2000

0830-0900 Registration

SESSION I
Chairman: Dr. M.A. Duwayri

0900-1100 Remarks on the Meeting by Mr. M.K. Papademetriou, FAO/RAP
Address by Dr. R.B. Singh, ADG/RR, RAP
Introduction of the Participants
Election of Chairman, Vice-Chairman and Rapporteur for Session II
Group Photograph

1100-1130 Coffee Break

SESSION II
Chairman: Dr. C.R. Hazra

1130-1200 Crop Diversification in Bangladesh
by Mr. M. Enamul Hoque

1200-1230 Crop Diversification in China
by Mr. Zuo Mengxiao

1230-1400 Lunch
Hosted by Dr. R.B. Singh, ADG/RR, RAP

1400-1430 Crop Diversification in India
by Dr. C.R. Hazra

1430-1500 Crop Diversification in Japan
by Dr. Masa Iwanaga

1500-1530 Crop Diversification in Malaysia
by Tunku Mahmud Bin Tunku Yahya

1530-1600 Coffee Break

1600-1630 Crop Diversification in Nepal
by Mr. K.C. Sharma

1630-1700 Crop Diversification in the Philippines
by Prof. Rene Rafael C. Espino

1700-1730 Crop Diversification in Sri Lanka
by Mr. L.A. Weerasena
**Wednesday, 5 July 2000**

0830-0900  Crop Diversification in Thailand  
by Mr. Chavalvut Chainuvati

0900-0930  Crop Diversification in Viet Nam  
by Prof. Nguyen Van Luat

0930-1000  Intensification of Crop Diversification in the Asia-Pacific Region  
by Prof. H.P.M. Gunasena

1000-1030  **Coffee Break**

1030-1100  UNCTAD's Project on Capacity Building for Diversification and Commodity-Based Development  
by Mr. Alexei N. Mojarov

1100-1200  Alternative Crops and Cultivars for New Opportunities  
by Dr. M.A. Duwayri

1200-1400  **Lunch Break**

1400-1530  Discussion on the Potential and Opportunities for Crop Diversification

1530-1600  **Coffee Break**

1600-1700  Discussion on the Constraints of Crop Diversification

**Thursday, 6 July 2000**

0830-1000  Plenary Session

1000-1030  **Coffee Break**

1030-1230  Workshop's Conclusions and Recommendations  
(Presentation and Discussion)

1230-1400  **Lunch Break**

1400-1600  Final Conclusions and Recommendations

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