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COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

CONTRIBUTION TO THE ESTIMATION OF COUNTRIES'INTERDEPENDENCE IN THE AREA OF PLANT GENETIC RESOURCES by Ximena Flores Palacios

This document was prepared at the request of the Secretariat of the FAO Commission on Genetic Resources for Food and Agriculture to provide information on individual countries' degrees of dependence on plant genetic resources from the primary centres of agricultural biodiversity. Notwithstanding the inherent limitations of this sort of study, it was decided to publish it as a first step towards a quantitative estimation of countries' interdependence with regard to plant genetic resources, in the conviction that it may contribute to facilitating the ongoing negotiations for the revision of the International Undertaking on Plant Genetic Resources for Food and Agriculture. The principal limitations of the study, which have been described at length in the text, result from a partial scientific knowledge of the distribution of biological diversity, from national and international statistics on production and agricultural trade that are not always complete or up-to-date, and from a still imperfect methodology. Readers' comments and criticisms could greatly contribute towards correcting possible errors and overcoming some of these limitations.

The text is the author's responsibility and does not necessarily represent the point of view of FAO or its members. The author, Ximena Flores Palacios, is an environmental economist and a consultant to the Bolivian Ministry of Sustainable Development.

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1. INTRODUCTION

General Considerations

Plant genetic resources for food and agriculture constitute the biological cornerstone of world food security and contribute to the survival of humanity. They include the genetic diversity provided by landraces, modern cultivars, wild relatives of cultivated crops and other species of wild plants used for food. Plant genetic resources represent the most important raw material for farmers and plant breeders, and serve as a repository of genetic adaptability and thus as a safety net in the event of environmental change.

Modern agriculture is heavily dependent on plant genetic resources from practically all countries. Crops such as cassava, maize, groundnut and bean originated in Latin America but have become food staples in many countries of sub-Saharan Africa, illustrating the interdependence of cropped species in the developing countries. Cassava is the main food crop for 200 million Africans in 31 countries and has a farmgate value of over US$ 7 billion. At the same time, Africa and its indigenous varieties of millet and sorghum have helped feed other parts of the world such as southern Asia (13%) and Latin America (8%).

While many countries maintain high levels of plant genetic diversity for food and agriculture in their germplasm banks and farmers' fields, they will probably, in the long run, need to have access to new genes in the centres of diversity of the cultivated species. There is therefore an ongoing need to exchange plant genetic resources (FAO, 1996).

Purpose of the study

In view of the importance of plant genetic resources for food and agriculture, this study sets out to assess the degree of dependence of a country's main food crops on genetic diversity in areas of origin and primary diversity located elsewhere.[1]

For the purposes of this study, the relative importance of crops is calculated on the basis of calorie intake from the crop and its derivatives. Protein, fat, vitamin and other forms of intake are not taken into consideration, nor is dependence on secondary centres of diversity or material collected in gene banks.

In this way, individual country dependence is viewed solely from the perspective of primary areas of diversity, which helps determine the importance of the primary areas in any multilateral collaborative system for the use and conservation of plant genetic resources.

Methodological aspects

The issue under examination is the dependence of all countries on plant genetic resources as these are not uniformly distributed. The fact that the industrialized countries hold the smallest pockets of *in situ* diversity but the largest germplasm banks, while the developing countries have the richest reserves, testifies to the interdependence of all countries and to the urgent need to foster common strategies for the use and conservation of these resources, with a sharing of both the responsibilities and the benefits.

The study uses the Food Energy Supply criterion (measured in calories) to determine which crops contribute most to human nutrition. This information serves to identify the most important crops

[1] The analysis is based on all countries included in FAO statistics.

which can then be coupled with a primary area of diversity. The degree of dependence of each country on genetic resources in other areas of diversity can then be gauged for the more important food crops. Despite its limitations, the food energy supply is an effective indicator of food security and of national levels of hunger and undernutrition.[2]

The chapter on methodology looks in more detail into the concept of food energy supply and analyses its scope and limitations in determining key food crops.

2. METHODOLOGY

2.1 Selection of Indicator

This paper uses food energy supply (FES), measured in calories, to determine which crops are important for human consumption. The underlying rationale is that this is a fundamental indicator for assessing food security and enables each crop to be associated with a primary area of diversity for an estimation of degree of dependence. While it has serious limitations as an indicator (for example, it does not take into consideration vitamins, protein and fat intake), it does at least help identify the most important crops and derivatives for human consumption.

Each country's per capita food consumption is calculated on the basis of FES expressed in calories, using the FAO food balance sheets and population figures. (FAO, 1997).

The food balance sheets state the supply and utilization of individual food commodities in any given year,

where:

Domestic Supply = Domestic Utilization

Domestic Supply = Production + Imports ± Stock Changes - Exports + Processed Trade

Utilization = Feed + Seeds + Food Manufacture + Other Uses + Waste + Human consumption

The quantity of each food commodity available for human consumption is given by:

Human Consumption = Production + Imports - Exports ± Stock Changes - (Feed + Seed + Food Manufacture + Other Uses + Waste)

The quantities of food available for human consumption are quantities that reach the consumer.[3]

Per capita food supply

The data on per capita food supply for human consumption during a reference period are expressed in terms of quantity, calorie value and protein and fat content. The figures are obtained by dividing the quantities available for human consumption by the total population actually consuming the food. Per capita food supply is therefore only the average supply available for the total population.

This paper only takes into account the calorie value of the food products as this is sufficient to determine which crops are important for human consumption.[4]

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[2] The food energy supply is used as an indicator of undernutrition in the developing countries. See FAO (1997), *Mapping Undernutrition*, Rome.

[3] Crops are often not consumed in their primary form as many enter the home as meal, milled rice, etc. Thus, the figures for "maize"include the quantity of maize, maize meal and other derivatives available for human consumption.

[4] Calorie intakes are expressed in kilocalories (1 calorie = 4.19 kilojoules).

Figure No. 1

FOOD BALANCE SHEETS [Example: Wheat in Argentina (1986)]

Domestic supply = Production + Imports ± Stock changes - Exports + Processed trade
Utilization = Feed + Seed + Food manufacture + Other Uses + Waste + Human consumption

Data: x (1000 metric tons)

Domestic Supply = 10333 + 4 + 1571 - 6950 - 106 = 4852
Utilization = 83 + 606 + 0 + 23 + 334 + 3806 = 4852
Human Consumption = 10333 + 4 + 1571 - 6950 - 106 - (83 + 606 + 0 + 23 + 334)
Human Consumption = 3806
Population: 30 330 000

Per capita supply:
Kilograms per year = 125.5

Supply per day
Grams: 343.8

Calories: 894
Proteins: 24
Fats: 2.5

Source: FAO Food Balance Sheets (1984-1986)

2.2 Stages in Determining the Degree of Dependence

a) Crop selection

Crops and their derivatives accounting for at least 0.5% of food energy supply (measured in calories) have been retained to ensure an aggregate selection accounting for a minimum coverage of 94%.

This led to the identification of 35 main crops and estimation of corresponding degrees of dependence on genetic diversity in areas of origin and primary diversity.

b) Identification of primary regions of diversity for each selected crop

- **Centres of origin and diversity**[5]

It is an acknowledged fact that plant genetic variability is not uniformly distributed throughout the world. In the 1920s the Russian geneticist Vavilov noted that certain parts of the world had a high level of inter- and intra-specific genetic variability. He identified the geographical areas with the highest genetic variability of cultivated food crops: Central America and Mexico, Andes, Chile and Brazil-Paraguay, Mediterranean, Central Asia, Near East, China, Ethiopia, India and Indo-Malaysia.

[5] In 1920 Vavilov identified areas with similar physiographic characteristics in which there was greater variability of the main cultivated species. Zhukovsky (1965) identified twelve megacentres of diversity. Subsequently Zeven and Zhukovsky (1975) prepared the Dictionary of cultivated Plants and their Regions of Divesity which was updated in 1982 by de wet J.m.J. and Zeven A.C.

The centres of origin proposed by Vavilov and their boundaries have been revised by a number of authors and many theories and concepts have evolved. Subsequent research has demonstrated that a centre of diversity is not necessarily the area in which the crop originated, as both crop domestication and subsequent development of genetic diversity affect the location of the centre of diversity.

The term "region of diversity" is currently used to refer to the variability generated by crops during their dispersal from point of origin. Thus, a plant population can be described at any point in its evolution by frequency of genes and genotypes, which illustrates its historical evolution. The regions of crop diversity are areas with high variability in number of alleles and genotypes. The genetic composition of these populations represents varying adjustments to ecological and social imperatives.[6]

- **Determination of regions of diversity**[7]

This paper uses the geographic distribution in *The State of the World's Plant Genetic Resources for Food and Agriculture* (FAO 1996), which groups countries into subregions corresponding to the cultivated crop megacentres described by Zeven and Zhukovsky (1975) on the basis of the centres identified by Vavilov.

[6] This paper uses the term primary region of diversity to refer to primary centres of origin and diversity.

[7] This paper uses the term primary region of diversity to refer to primary centres of origin and diversity.

Figure No. 2

CROPS AND THEIR PRIMARY CENTRES OF ORIGIN

1. Rice	E./S.E./S. Asia/W. Africa
2. Wheat	W. & C. Asia
3. Sugar:	
- Cane	S.E. & S. Asia/Pacific
- Beet	Mediterranean/Europe
4. Maize	C. America
5. Soybean	E. Asia
6. Potato	S. America
7. Cassava	S. America (Brazil-Paraguay) & C. America
8. Sorghum	Africa
9. Millet	Africa (excl. C. Africa)/S.E./S./E. Asia
10. Barley	W. & C. Asia/Mediterranean
11. Sweet potato	S./C. America
12. Oil palm	W. Africa
13. Rape/Mustard	Mediterranean/Europe/E. Africa
14. Beans	
Phaseolus	S. & C. America
Vicia	C. Asia
15. Groundnut	S. America
16. Banana/Plantain	S.E. & S. Asia/Indian Ocean
17. Cotton	S. & E. Africa/C. Asia/S. & C. America
18. Coconut/Copra	Pacific/S.E. Asia
19. Yam	S.E. & S. Asia/Africa
20. Orange	E. Asia
21. Grape	Mediterranean/W. & C. Asia
22. Apple	Europe/C. Asia
23. Sesame	S. & C. Asia/E. Africa
24. Olive	Mediterranean
25. Oat	Mediterranean/Europe
26. Rye	W. Asia
27. Tomato	S. America
28. Cocoa	S. America
29. Sunflower	N. America
30. Date	Mediterranean/W. Africa
31. Grapefruit	S.E. Asia
32. Pea	W. Asia/E. Africa
33. Onion	C. Asia
34. Paprika	Caribbean
35. Pineapple	S. America

Source: Based on FAO (1996), *The State of the World's Plant Genetic Resources for Food and Agriculture* and Zeven A.C. and de Wet J.M.J. (1982), *Dictionary of Cultivated Plants and their Regions of Diversity*, Centre for Agricultural Publishing and Documentation: Wageningen.

- **Identification of countries in the areas of diversity**

While the concept of centres of diversity as formulated by Vavilov and subsequently developed by other authors was not designed to specifically link countries with primary regions and while the subregions listed in *The State of the World's Plant Genetic Resources for Food and Agriculture* (1996) sometimes overlap, the only purpose of this exercise is to indicate which countries belong to a particular region of primary diversity. It should also be understood that this will not necessarily include all the countries in the area.

While this approach has acknowledged limitations from the methodological perspective, it nevertheless contributes usefully to the general debate and can provide a springboard for further research into the role that the primary centres of diversity should play in a multilateral system of use and conservation of plant genetic resources for food and agriculture.[8]

c) Determination of degree of national dependence on genes from other areas of diversity

Four crop groups have been differentiated to determine the degree of dependence on genes from other primary regions of diversity:

- C1: crops for which the country forms part of a primary region of diversity.
- C2: crops with genes from other primary regions of diversity.
- C3: groups of "other"crops in FAO food balance sheets (e.g. cereals, vegetables, pulses and fruits).
- C4: Other crops not included in the analysis, i.e. those accounting for under 0.5% of food energy supply (measured in calories). Their aggregate total never exceeds 6%.

The crops were selected and ranked in order of calorie intake. Their origin was then determined and a percentage degree of dependence estimated.

The degree of dependence has maximum and minimum indices, which are calculated as follows:

Index of maximum dependence = 100% - ∑% C1

Index of minimum dependence = 100% - ∑% C1 - ∑[(% C3 + C4)

Assumptions:

Maximum index: unspecified crops and other crops not included in the analysis originate from other areas of diversity.

Minimum index: unspecified crops and other crops not included in the analysis originate in the country which is part of the region of diversity.

[8] The scientific study has not focused on identifying primary centres in each country for the different crops but only considers major areas based on the classification of vavilov and his successors. The boundaries of the primary regions of diversity often do not coincide with political borders.

Figure No. 3
Example: sources of plant-derived energy - Egypt (1994)

Products	Energy supply (calories/day)	%	Centre of origin
Wheat	1148.00	37.46	W.& C. Asia
Maize	595.70	19.44	C. America
Rice	407.30	13.29	E.& SE.& S.Asia/W. Africa
Sugar	269.60	8.80	*
Sunflower oil	85.20	2.78	N America
Cottonseed oil	71.36	2.33	S.& C. America/C. Asia/E.& S. Africa
Other pulses	62.58	2.04	NS
Potatoes	41.07	1.34	S America
Dates	33.99	1.30	Mediterranean/W.Africa
Sorghum	38.58	1.26	Africa
Other vegetables	36.22	1.18	NS
Tomatoes	35.93	1.17	S. America
Soybean	31.50	1.03	E. Asia
Other fruits	24.28	0.79	NS
Oranges	20.49	0.67	E. Asia
Grapes	10.09	0.62	Mediterranean/W.& C. Asia
Sugarcane	18.67	0.61	SE. & S. Asia/Pacific
TOTAL	2945.50	96.10	

Notes: * Sugar: cane (SE & S. Asia/Pacific); beet (Mediterranean/Europe)
NS: not specified

Source:: FAO. Food Balance Sheets (1994)

Index of minimum dependence = 100 - Σ% C1 - Σ% (C3 + C4)
= 100 - 1.3 - (4.01 + 3.89) = 90.8%

Index of maximum dependence = 100 - Σ% C1
= 100 - 1.3 = 98.7%

Egypt has a degree of dependence on genes from other areas of diversity of between 90.8% and 98.7%.

3. RESULTS

Sources of plant-derived food energy (on country basis)

(See Consultation Annex No. 1**)**

3.1 Structure of the Analytical Tables

The analysis of sources of plant-derived food energy has been based on country tables of crops and derivatives contributing to food energy supply, measured in absolute and percentage calorie values. Each crop has also been associated with a primary region of diversity. (See Chart No. 3).

- The first column lists crops and derivatives that account for at least 0.5% of food energy from plants.[9]
- The second column indicates the calories supplied by the crops and their derivatives. The fact that these contribute 0.5% or more of food energy supply gives an aggregate of at least 94% of total energy derived from plants.
- The third column gives the calorie supply as a percentage proportion of total plant-derived energy.
- The fourth column associates each crop and its derivatives with one or more primary area of diversity in order to determine a country's dependence on genes from other areas of diversity.[10]

3.2 Identification of Crops Contributing to Food Energy Supply

A total of 35 crops and derivatives account for the bulk of food energy supply, as expressed in calorie terms.

- Cereals: rice, wheat, maize, sorghum, millet, barley, oat and rye.
- Roots and tubers: potato, sweet potato, cassava and yam.
- Sweeteners: high calorie contributions from sugarcane and sugarbeet
- Pulses: beans (*Phaseolus* or *Vicia*) and peas.
- Oilcrops; soybean, groundnut, sesame, oil palm, rape and mustardseed, cottonseed, coconut/copra, olives and sunflower.
- Vegetables: onion and tomato.
- Fruits: plantain, banana, apple, grape, date, pineapple, orange and grapefruit.
- Alcoholic beverages: wine (grape) and beer (barley).
- Stimulants: cocoa.
- Spices: paprika

[9] FAO's food energy supply data are based on two main sources: (a) production data and (b) commodity trade data. Crop derivatives have not been specified, in keeping with the presentation format of the FAO Food Balance Sheets. Presenting the information in this manner is justified as in many cases the crops are nto consumed in their primary form.

[10] Only derivatives of specified crops are taken into consideration when associating a crop with one or more primary centre(s) of diversity. It is not possible to determine centrs of origin for unspecified groups of products (e.g. "cereals and other products").

- Not specified: “minor crops” consumed in the country.

A global breakdown of food energy supply shows cereals accounting for over 60% of intake, roots and tubers over 6%, sweeteners over 10%, pulses over 2%, oilcrops over 10%, vegetables 2% and fruits almost 2%.[11]

3.3 Results of Dependence Analysis

Estimates of degrees of dependence of main food crops on genetic resources from other primary regions of diversity were conducted for six regional groups: Africa, Asia and the Pacific, Near East, Europe, Latin America and the Caribbean, and North America. These regions were then divided into subregions, which in many cases corresponded to areas of diversity.[12]

Grouping countries in this way made it possible to link countries with primary regions of diversity, although it should be noted that not all countries in a particular subregion belong to the primary areas of crop diversity. (See regional summary tables).

[11] These data refer to 94% of the crops and do not take into account the unspecified crops in FAO statistics which exceed 7%.

[12] The country-by-country analysis was based on the subregions used by the FAO Commission on Genetic Resources for Food and Agriculture. This helped identify the primary areas of diversity more accurately.

A. AFRICA

A.1 Central Africa

The degree of country dependence in Central Africa is: Cameroon 70%-81%, Central African Republic 67%-82%, Democratic Republic of Congo 87%-93%, Republic of Congo 82%-94%, Gabon 78%-86% and Sao Tomé and Principe 83%-93%.

Given that the "other crops" reported in the FAO statistics do not exceed 11% in any country, the data for Central Africa reveal generally high degrees of dependence due to the consumption of crops and derivatives from other primary areas of diversity, more specifically maize, cassava, plantain, banana, wheat and groundnut.

Some countries belong to the primary areas of diversity for yam, sorghum, millet and oil palm. The calorie supply from native crops exceeds 15% in Cameroon and Central African Republic and is almost 10% in Democratic Republic of Congo, Republic of Congo, Gabon and Sao Tomé and Principe. The most important secondary crops originating in the subregion are kenaf and cowpea.

A.2 East Africa

The degrees of dependence in East Africa are: Burundi 83%-97%, Djibouti 91%-99%, Eritrea 49%-67%, Ethiopia 28%-56%, Kenya 89%-98%, Rwanda 80%-94%, Somalia 65%-69%, Sudan 38%-47% and Uganda 76%-88%.

Some countries belong to the primary region for sorghum, millet, yam and cotton..

The high dependence of Burundi, Djibouti, Kenya, Rwanda and Uganda is due to consumption of crops and derivatives from other primary areas of diversity: *Phaseolus* (bean and faba bean), maize, sweet potato, cassava, banana, plantain, wheat and rice. The calorie supply from local crops is below 7%, with the exception of Uganda (12%).

Dependence is relatively low in Eritrea, Ethiopia and Somalia because these are important primary centres of diversity and because calorie intake from indigenous crops is high. Ethiopia has been considered an important primary centre of diversity for wheat and barley when estimating its degree of dependence.

The unspecified crops in FAO statistics post high percentages in this subregion because of the importance of secondary crops such as tef, *Avena abyssinian*, *Brassica carinata* (Ethiopia and Eritrea), varieties of pea (pigeon pea and cowpea), *ensete* and kenaf. This explains why unspecified crops total 25% in Ethiopia, 15% in Eritrea, 12% in Burundi and 11% in Rwanda.

A.3 Southern Africa

Dependence in the countries of Southern Africa is as follows: Angola 92%-98%, Botswana 65%-84%, Lesotho 82%-92%, Malawi 89%-100%, Mozambique 86%-94%, Namibia 51%-82%, South Africa 90%-98%, Swaziland 77%-100%, Tanzania 84%-94%, Zambia 91%-98% and Zimbabwe 89%-95%.

Some countries belong to the primary region of diversity for sorghum, millet and yam.

The high estimated dependence of these countries stems from the large calorie intake from maize, cassava, wheat, rice, *Phaseolus* (bean and haba bean), plantain, banana and potato, whose primary centres of diversity are located elsewhere. Calorie supply from crops originating in the area are high, particularly in Namibia and Botswana where they exceed 15%. It is, however, surprising that no energy supply from sorghum is reported for countries such as Angola. This could be because of incomplete data.

Although the degrees of dependence are high, the percentages of unspecified crops in FAO statistics are also high: Namibia 31%, Swaziland 21%, Botswana 15%, Lesotho and Malawi 8%, Tanzania 7%, Mozambique and South Africa 5% and Zambia and Zimbabwe 4%. These high percentages of unspecified crops have precluded any identification of primary area of diversity, so the degrees of dependence have to be considered in their proper context. The unspecified crops no doubt refer to crops native to the subregion, including cowpea, *Cucumis spp.*, *Ensete*, sorrel and kenaf.

A.4 West Africa

Dependence in West Africa is: Benin 65%-72%, Burkina Faso 23%-32%, Cape Verde 73%-81%, Chad 59%-68%, Côte d'Ivoire 53%-62%, Gambia 62%-67%, Ghana 70%-81%, Guinea 47%-63%, Guinea Bissau 25%-42%, Liberia 61%-70%, Mali 27%-36%, Mauritania 54%-60%, Niger 13%-27%, Nigeria 46%-61%, Senegal 64%-69%, Sierra Leone 35%-46% and Togo 64%-70%.

Some countries of West Africa belong to the primary region of diversity for sorghum, millet, oil palm, yam, dates and rice (*Oryza glaberrima*). The main sources of calorie intake are crops originating elsewhere, in particular maize, cassava, groundnut, wheat, sugar, plantain and banana. However, crops originating in the area contribute significantly in Burkina Faso, where sorghum and millet alone account for over 60% of energy supply, in Sierra Leone where rice and oil palm account for over 50%, in Guinea Bissau where rice and millet provide more than 50%, in the Gambia where rice and millet provide 45% and in Nigeria where sorghum, millet, yam and oil palm contribute 40%.

A high level of energy is supplied by unspecified crops. The more important secondary crops include fonio, cowpea, bambara nut, melon and cola nut.

A.5 Indian Ocean

Levels in the Indian Ocean countries are: Comoros 91%-100%, Madagascar 94%-100%, Mauritius 89%-100% and Seychelles 85%-100%.

Some of the countries belong to the primary region of diversity for yam, and Madagascar is a primary centre of diversity for coffee.

Calorie intake is from crops from other areas of diversity, in particular rice, cassava, maize, plantain, banana, coconut, sugar and soybean. Contributions from local crops, for example yam and coffee, are undoubtedly below 0.5% as they are not included among the food commodities that together make up 94% or more of total energy supply.

While not part of any primary region of diversity, except for yam and for coffee in the case of Madagascar, the Indian Ocean islands are important secondary centres for banana, sugarcane and rice.

B. ASIA AND THE PACIFIC

B.1 South Asia

Degrees of dependence in South Asia are: Bangladesh 14%-21%, India 35%-47%, Maldives 37%-51%, Nepal 47%-57% and Sri Lanka 38%-45%.

Some countries of South Asia belong to the primary area of diversity for rice, sugarcane, banana, sesame and millet, while India is a primary centre for cotton, and both India and Bangladesh are primary centres for *Brassica rapa* and *Brassica juncea*.

The relatively low dependence is due to high consumption of local crops, mainly rice (providing a calorie supply in Bangladesh of 75%, Sri Lanka 42%, India and Nepal 35%, and Maldives 27%). There is also significant energy supply from other crops of local origin such as sugarcane and millet.

Crops originating elsewhere, particularly wheat and maize, are also important.

The unspecified crops do not exceed 6% in this subregion, except in Bangladesh where they account for 12% of energy intake. Important among these unspecified secondary crops are: urd bean, mung bean, moth bean, winged bean, pigeon bean, cowpea, eggplant, okra, cucumber, leaf mustard, horseradish, cocoyam, sunn hemp, cotton-tree, ginger, turmeric and cardamom.

B.2 Southeast Asia

The degrees of dependence in Southeast Asia are: Brunei 30%-47%, Cambodia 7%-12%, Indonesia 29%-33%, Laos 13%-24%, Malaysia 32%-40%, Myanmar 13%-19%, Philippines 28%-38%, Thailand 13%-26% and Viet Nam 13%-19%.

The countries of Southeast Asia belong to the primary area of diversity for rice, yam, banana, sugarcane, coconut/copra and citrus.

The relatively low degrees of dependence in this region are due to energy supply from rice, amounting to 84% in Cambodia, over 70% in Myanmar, Viet Nam and Laos, over 50% in Thailand and Indonesia, and almost 40% in Brunei, Malaysia and the Philippines. Other native crops such as sugarcane, banana and coconut also provide a significant supply. Important non-local crops contributing to food energy supply (in calories) include wheat, maize, sweet potato, cassava and soybean.

The unspecified crops score low percentages in Indonesia, Malaysia, Myanmar and Viet Nam (below 3.5%) but higher values in the other countries of the subregion: 13% in Brunei, 8% in Thailand and about 7% in Laos and Philippines. These percentages could refer to subregional secondary crops such as rice bean, breadfruit, rambutan, durian, bamboo, nutmeg, clove, sago, ginger, cocoyam and betel nut.

B.3 East Asia

Dependence in the countries of East Asia is: China 46%-55%, Japan 43%-61%, Democratic People's Republic of Korea 44%-60%, Republic of Korea 30%-54% and Mongolia 95%-99%.

The countries of East Asia belong to the primary region of diversity for rice, soybean, orange, *Brassica*, millet, tea and onion.

Native crops contribute significantly to food energy supply, particularly rice which accounts for almost 40% in China and the Republic of Korea and about 30% in Japan and in the Democratic People's Republic of Korea. Energy from soybean is also high as is – albeit it to a lesser extent – energy from citrus.

The main sources of calories in Mongolia are crops from other areas, such as wheat, sugar and potato, with the native millet only providing a small percentage. Non-local energy supply in the other countries is mainly from wheat, sugar, maize and potato.

The unspecified crops account for 19% in Republic of Korea, 15% in Democratic People's Republic of Korea, 12% in Japan and 5% in China. The important secondary crops in the subregion include adzuki bean, bamboo, China grass and Tung.

B.4 Pacific[13]

The degrees of dependence in the countries of the Pacific are: Australia 88%-100%, Fiji 65%-77%, New Zealand 87%-100%, Papua New Guinea 76%-100%, Solomon Islands 66%-84% and Vanuatu 37%-74%.

[13] Reference to the Australia/Pacific subregion permits a more precise identification of the centres of origin. Australia is the primary centre for macadamia nut, *Acacia* and *Eucalyptus*. The pacific Islands are primary centres for coconut, sugarcane and other secondary crops.

Some Pacific countries belong to the primary region of diversity for sugarcane and coconut/copra.

Calorie supply from crops originating elsewhere is high and is mainly from wheat, rice, barley, potato, maize, soybean and sweet potato. Energy from crops of local origin is important in the Pacific Islands (coconut and sugarcane).

The percentages of unspecified crops are high: 35% in Vanuatu, 22% in Papua New Guinea, 16% in Solomon Islands, 8% in New Zealand and Fiji and 7% in Australia. These are undoubtedly secondary crops of subregional importance, notably macadamia nut and certain varieties of rice and banana.

C. NEAR EAST

C.1 Southeast Mediterranean

The degrees of dependence in the Southeast Mediterranean countries are: Algeria 74%-80%, Cyprus 79%-90%, Egypt 91%-99%, Israel 28%-42%, Jordan 21%-30%, Lebanon 34%-59%, Libya 67%-81%, Malta 84%-98%, Morocco 58%-75%, Syria 14%-23% and Tunisia 69%-83%.

Some countries of the Southeast Mediterranean belong to the primary region of diversity for barley, oat, *Brassica*, olive, grape, beet and dates. Israel, Jordan, Lebanon and Syria belong to the primary centres of diversity for wheat and rye.

The relatively high dependence of Algeria, Cyprus, Egypt, Libya and Malta indicates a calorie supply predominantly from crops not originating in the area: wheat, rice, soybean, potato and maize.

The relatively low dependence of Israel, Jordan, Lebanon and Syria is due to their belonging to the primary centres of diversity for wheat, which accounts for 58% of food energy supply in Syria, 50% in Jordan, almost 40% in Israel and 35% in Lebanon.

The unspecified crops account for almost 20% in Lebanon, about 10% in Israel and Malta, between 6% and 8% in Cyprus, Syria and Tunisia and slightly below 5% in Egypt and Jordan. These are undoubtedly secondary crops such as *Trifolium/Bersim*, lupine, Crocus and linseed.

C.2 West Asia

The degrees of dependence in the countries of West Asia are: Afghanistan 29%-34%, Iran 91%-98%, Iraq 83%-89%, Kuwait 84%-99%, Pakistan 33%-41%, Saudi Arabia 83%-93%, Turkey 32%-43%, United Arab Emirates 84%-100% and Yemen 41%-48%.

Some of the countries belong to the primary region of diversity for wheat, barley, oat and grape. Pakistan is a primary centre of diversity for cotton and rye, while Turkey is a primary centre for *Brassica*, olive and rye.

The relatively low dependence of Afghanistan, Iran, Iraq, Pakistan, Saudi Arabia, Turkey and Yemen is due to high energy supply from native crops such as wheat and barley.

The non-native crops providing high energy supply are rice, maize, sugar, potato and oil palm.

The percentages of unspecified crops are below 4% in Afghanistan, Pakistan, Iraq and Yemen, between 6% and 9% in Iran, Saudi Arabia, Syria, Tunisia and Turkey and about 11% in Kuwait and the United Arab Emirates.

The subregion is an important centre of diversity for fruits such as apricot, plum, pear, apple, pistachio, fig, pomegranate and almond. Important secondary crops in the region include hemp, flax and lupine.

C.3 Central Asia

Degrees of dependence in the countries of Central Asia are: Azerbaijan 14%-16%, Kazakhstan 42%-45%, Kyrgyzstan 23%-25%, Tajikistan 16%-18%, Turkmenistan 17%-19%, and Uzbekistan 17%-20%.

The countries of Central Asia belong to the primary region of diversity for wheat, barley, rye, cotton, onion, *Phaseolus* (bababean), apple, grape and cotton.

The low levels of dependence are due to the concentration of energy supply from a single native crop - wheat - which accounts for almost 80% in Azerbaijan, over 70% in Tajikistan, Turkmenistan and Uzbekistan, and about 60% in Kazakhstan and Kyrgyzstan.

Food energy from crops originating elsewhere is clearly low in the subregion and is primarily from rice, sugar and potato.

Central Asia is a primary centre of diversity for a variety of fruits, including apple, grape, apricot, plum, pear, nut, almond, pistachio and melon.

D. EUROPE

The degrees of dependence in Western Europe are: Austria 81%-98%, Belgium-Luxembourg 82%-98%, Denmark 81%-92%, Finland 89%-99%, France 76%-91%, Germany 83%-98%, Greece 54%-69%, Iceland 84%-99%, Ireland 85%-99%, Italy 71%-81%, Netherlands 88%-98%, Norway 91%-99%, Portugal 79%-91%, Spain 71%-85%, Sweden 89%-99%, Switzerland 82%-98% and United Kingdom 89%-99%.

Some European countries belong to the primary region of diversity for apples. The countries of the Caucasus belong to the region of diversity for rye, while the Mediterranean countries are part of the region of diversity for olive and grape.

The levels of dependence in Eastern Europe are: Albania 92%-99%, Armenia 86%-90%, Belarus 44%-53%, Bosnia Herzegovina 86%-99%, Bulgaria 88%-99%, Croatia 87%-99%, Estonia 87%-95%, Georgia 19%-21%, Hungary 87%-98%, Latvia 81%-90%, Lithuania 92%-98%, Macedonia 68%-89%, Moldova 81%-85%, Poland 90%-99%, Romania 90%-99%, Russia 23%-33%, Ukraine 76%-83%, and Yugoslavia 89%-99%.

The relatively high dependence of European countries (excluding those of the Mediterranean region and of the former-USSR) is due to the energy supply from crops originating elsewhere, such as wheat, sugar, potato, barley, soybean, rice and maize.

E. LATIN AMERICA AND THE CARIBBEAN

E.1 South America

Some countries of South America belong to the primary region of diversity for potato, sweet potato, tomato, cocoa, *Phaseolus* (beans), cassava, groundnut and pineapple.

The Andean countries are important primary centres of plant genetic diversity, although the statistics indicate a relatively low consumption of products derived from native crops. The degrees of dependence in the Andean countries are: Bolivia 81%-93%, Ecuador 89%-97%, Peru 80%-93%, Colombia 84%-94%, Venezuela 88%-99%, Chile 86%-94% and Argentina 89%-95%.

The levels of calorie supply from crops not originating in the subregion are high and come mainly from wheat, sugar, rice, maize, soybean, plantain and banana. Calorie supply from native crops is low, except for potato and *Phaseolus* (beans).

The unspecified crops vary between 4% and 10% and undoubtedly refer to secondary crops of subregional importance, including tubers (*Tropaeolum tuberosum, Oxalis tuberosa, Solanum curtilobum, Ullucus tuberosus*); roots (*Canna edulis, Arracacia xanthorrhiza, Mirabilis*

expansa); grain crops (*Amaranthus caudatus, Chenopodium quinoa, Chenopodium pallidicaule*); pulses (*Phaseolus vulgaris, Lupinus mutabilis*); and fruits (*Lucuma obovata, Carica pubescens, Solanum muricatum, Passiflora mollissima*).

Brazil and Paraguay are primary centres of diversity for cassava and cocoa. Brazil has a dependence of 81%-94% and Paraguay 67%-81%. The main sources of energy from crops not originating in the area are sugar, rice, wheat and maize. Only cassava, which supplies 5% in Brazil and 17% in Paraguay, is from the primary centre of diversity of Brazil/Paraguay.

Uruguay is not a primary centre of diversity for its main food crops and has a high level of dependence of 90%-100%.

The degrees of dependence of Suriname and Guyana are 95%-98% and 90%-100% respectively.

Important secondary crops in the Amazon region include: *Xanthosoma sagittifolium, Bertholletia excelsa, Capsicum spp., Jessenia/Oenocarpus* complex and *Ilex paraguariensis*.

E.2 Central America

The countries of Central America are primary centres of diversity for maize, *Phaseolus* (beans) and cassava, which account for a high proportion of food energy supply. Most dependence levels are therefore relatively low: Costa Rica 80%-96%, El Salvador 50%-63%, Guatemala 38%-49%, Honduras 50%-59%, Mexico 45%-59%, Nicaragua 62%-75%, and Panama 76%-87%.

Costa Rica and Panama have relatively high degrees of dependence due to energy supplied by crops not from the area, such as sugar, rice, wheat, soybean, plantain and banana.

The relatively low levels of dependence of El Salvador, Guatemala, Honduras, Mexico and Nicaragua are explained by the fact that maize - a native crop - accounts for a significant proportion of food energy supply (32% in El Salvador, 50% in Guatemala, 42% in Honduras, 41% in Mexico and 24% in Nicaragua). The energy intake from non-native crops is from sugar, wheat, soybean, rice, barley, plantain and banana.

The unspecified crops do not exceed 6% in the Central American countries, indicating a low level of consumption of secondary crops. These include *Phaseolus spp., Cucurbita spp., Sechium edule, Annona spp., Amaranthus spp., Pouteria sapota, Spondias purpurea*, and *Physalis philadelphica*.

E.3 Caribbean

The countries of the Caribbean belong to the primary region of diversity for cassava and paprika.

The countries of this subregion have high levels of dependence: Antigua and Barbuda 63%-100%, Bahamas 59%-100%, Barbados 79-100%, Belize 82%-100%, Cuba 87%-97%, Dominican Republic 87%-98%, Grenada 74%-100%, Haiti 82%-95%, Jamaica 88%-99%, Saint Kitts and Nevis 83%-100%, Saint Lucia 80%-99%, Saint Vincent and the Grenadines 78% -100%, and Trinidad and Tobago 86%-100%.

Some degrees of dependence have minimum-to-maximum ranges of more than 30%. This is because the percentages of unspecified crops are very high and concern secondary crops.

Food energy supply is mainly from wheat, sugar, rice and soybean oil.

F. NORTH AMERICA

The countries of North America belong to the primary region of diversity for sunflower.

The degrees of dependence of Canada and the United States are high, at 84%-99% and 77%-100% respectively.

Non-native crops contributing extensively to food energy supply include wheat, sugar, soybean, potato, maize, barley, rice and groundnut.

4. CONCLUSIONS AND LIMITATIONS OF THE STUDY

4.1 Findings

a) Primary regions of diversity

The main food staples cultivated and consumed by the vast majority of the world's population have their origins in the tropical and sub-tropical zones of Asia, Africa and Latin America. The main crops on which humanity now depends have been bred and domesticated by farmers over the centuries. However, the agricultural role of the secondary centres and germplasm banks must also be taken into account. This study highlights the fact that any analysis of dependence focusing exclusively on the primary regions of diversity can produce distorted results. A global system needs to be promoted internationally as a large proportion of the germplasm used in any given country's agriculture comes from elsewhere. However, a first step has been taken in identifying the role to be played by the primary centres of diversity in strategies for the utilization and conservation of plant genetic resources.

The relative importance of the primary regions of diversity

It is rare for modern cultivars to derive directly from material obtained in the primary centres of diversity. Particularly in the case of the more important food crops, the pedigrees of modern varieties are complex and include lines obtained from many distinct parts of the world generally situated outside the primary regions of diversity. In some cases, the material needed for the production of modern crops may well be located in a small part of the primary centre of origin, but in general it will be the result of a long process of domestication in other areas. Failure to take this into account ignores the contribution of many generations of farmers, away from the centres of diversity, who have provided the inputs needed for the development of today's improved varieties.

Smale and McBride (1996) have identified seventeen major parents of modern bread wheat. The material comes not only from countries that are centres of diversity of wheat (South Russia, Turkey and Palestine) but also from Europe, India, Korea, japan, Africa, United states, Uruguay and Australia. The authors examined the pedigrees of wheat varieties and local cultivars grown in developing countries and calculated the percentage contributions of each area of origin. The largest percentage contributions are from South Asia, Sub-Saharan Africa, the Southern Cone countries of South America, the countries of the former USSR, Poland and Germany. The wheat cultivar Sonalika, which was planted in over 6 million hectares in the developing countries in 1990, has 39 local cultivars and a pedigree drawing from at least 15 countries (Mexico, Kenya, Turkey, Japan, Brazil, Italy, Netherlands, United Kingdom, Poland, Australia, India, Russia, Spain, Argentina, Georgia). This is a clear example of the interdependence of all countries for the cultivation of modern varieties, in terms of primary centres but also secondary centres and germplasm banks (Hodgkin, T. 1997).

b*)* ***Main crops***

The study of dependence has revealed relatively uniform food consumption patterns that are strongly determined by a few crops. Four alone - rice, wheat, sugar (cane and beet) and maize - account for over 60% of human calorie intake from plants.

Wheat is an important element of food security in all subregions and regions, especially in Central Asia and the southern Mediterranean. Rice is important in South East Asia, the Indian Ocean islands, West Africa, the Caribbean and South America. Maize is important in Central and South America and Africa. Sorghum is a key crop in South Asia and especially in Africa. Cassava is a mainstay in many African countries. Sweet potato is important in Africa (West, East and Central), the Caribbean and the Indian Ocean islands; plantain and banana in Africa (West, East and Central); beans in Central America and Africa (West, East and South); soybean throughout the American Continent, in the Caribbean, Europe and the Pacific; sugarcane in all regions except for West and Central Africa.

How many plants feed the world?

Prescott-Allen R. & Prescott-Allen C. (1990), carried out a study to determine how many plants feed the world. They used FAO's food balance sheets as their reference and considered the data for 146 countries and 90% of plant products, each examined in terms of weight and calorie, protein and fat supply.

The food commodities were divided into two groups: by species, as in the case of cabbage which has a specific taxonomy; and by other products, such as hydrogenated oils where taxonomic origin is unknown. A total of 82 products by species and 28 general products accounted fro 90% of products supplying food energy.

The 82 products by species include 103 plant species and, of these, 56 products are related to 75 taxonomic species corresponding to 5% of crops of importance to a specific country in terms of weight, protein and vegetable fats. In this way, the secondary crops were also included, leading to the conclusion that the world is fed by at least 103 plants.

c) Secondary crops

The study has also shed light on the low level of consumption of products from so-called secondary or neglected species, which are those cultivated or semi-cultivated species that in other times and under different circumstances played an important role in traditional agriculture and in the supply of food for indigenous populations and local communities.

The main causes for this decline include: (a) the introduction of substitute species; (b) the loss of competitivity of these species against more productive species; (c) gradual changes in demand; (d) economic, cultural, policy and/or religious prohibitions and; (e) the disappearance of ethnic groups that knew how to grow, process and use the plants.

FAO has estimated that a large proportion of the genetic diversity of cultivated crops has been lost since the beginning of this century and that there is an ever-greater risk of depending on fewer, more uniform - but because of this more vulnerable - species and varieties. An important reason is that standard commercial varieties are replacing traditional varieties, even in the centres of diversity (which is particularly worrying). The traditional varieties gradually disappear when farmers abandon their landraces and opt to grow new plant varieties. "Modern" agriculture generally favours the genetic uniformity of a limited number of high-yield crops and in the process the traditional varieties and secondary crops are lost.

d) Degrees of dependence

Bearing in mind the statistical and methodological limitations, the analysis of degree of dependence indicates that:

- Low dependence does mean high food security, as borne out in Asia, Africa, and Latin America and the Caribbean.

- The estimated degrees of dependence are only "indicative" as the national and FAO baseline data do not include production that remains outside the formal trading sector (through on-farm consumption, barter arrangements, etc.). This means that secondary crops which sometimes account for as much as one third of calorie supply, are not adequately reflected.

4.2 Methodology

a) Indicator

- Regarding the selection of crops, the food energy supply indicator only considers a country's calorie intake and neglects the role of vegetables and fruits that provide few calories but are nutritionally important as sources of essential vitamins, minerals and proteins, or the role of other non-food products such as fibres. However, the exclusive consideration of calorie supply in this study is justified by the fact that this is a fundamental indicator of the national food security situation.

- The indicator does not reflect possible dietary differences among population groups in any given country, differentiated for example in terms of socio-economic status, ecological zone or geographical area. Nor does it provide information on seasonal fluctuations in total food supply. (FAO 1984).[14]

- The study has only considered plant-derived food energy, whereas in some countries a high proportion of food energy comes from animal products.

b) Sources of information

- The baseline data refer to 1994 after which no information is available.

- The FAO food balance sheets are compiled from production and trade data for each country. This means that, for many developing countries, production remaining outside the formal trade channels is not considered (on-farm consumption, bartering systems, etc.). As a result the real importance of some primary and secondary crops to national food supply is not properly identified, which can undermine any attempt to fine-tune strategies for the use and conservation of plant genetic resources.

- The FAO food balance sheets have an "other" crops item, which prevents secondary crops and their respective primary centres of diversity from being identified. This has distorted

[14] For a more detailed analysis, FAO recommends that indirect indicators such as household food expenditure or consumption surveys be used to estimate the distribution of available food supplies in individual countries. This would give an approximate idea of the percentage of the population with, for example, insufficient access to food to reach the nutritional threshold.

the analysis of the more important crops, especially if we consider that secondary or local crops sometimes make up one third of a country's calorie supply.

4.3 Analysis of Dependence

a) This is a static analysis in that it refers to one baseline year.[15]

b) Only the primary regions of diversity have been considered, not the secondary areas.

c) Dependence on the network of the *ex situ* collections has not been considered.

d) No other indicators have been used to compare the results obtained from food energy supply and thus improve and broaden the analysis of interdependence.

4.4 Recommendations

The following recommendations could help complete and refine this study and its estimates of national degrees of dependence.

- In-depth studies of selected countries for an integrated analysis of the interdependence of countries in the area of plant genetic resources for food and agriculture. Such studies would consider dependence on primary centres, secondary centres and germplasm banks.
- Studies of the dependence of countries on plant genetic resources for food and agriculture for production and consumption in the countries, in addition to dependence on imports and food aid and their effect on agricultural production.[16]

- The so-called secondary crops should be included in any analysis as these are clearly important to the food situation in developing countries. Sole consideration of primary crops produces a distorted picture which could lead to misconceived prescriptions for the utilization and conservation of plant genetic resources.
- Dependence needs to be assessed in economic terms.

[15] The most recent data for the FAO food balance sheets refer to 1994.

[16] An interesting analysis of regional interdependence regarding genetic resources for food and agriculture was carried out by Kloppenburg JR and Kleinman DL, 1987, Seeds of Controversy: national property versus common heritage. In: Seeds and Sovereignty. The use and control of plant genetic resources. Duke University Press. A total of 20 food crops and 20 industrial crops were selected on the basis of their global economic importance in terms of production volume. An area of diversity was assigned to each crop. The central objective was to determine the contribution of each region to the present state of genetic resources and at the same time to estimate the dependence on other regions of diversity.

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AFRICA

TABLE NO. 1
FOOD ENERGY FROM CROPS (AFRICA 1994)

FOOD ENERGY SUPPLY (CALORIES/DAY) %

PRODUCT	MAIZE	WHEAT	CASSAVA	SORGHUM	RICE(2)	SUGAR	MILLET	YAM	PLANTAIN BANANA	OIL PALM	GROUNDNUT	BARLEY	BEAN	SWEET POTATO	SUNFLOWER OIL	C3(3)	OTHER(1)	C4(4)	DEGREE OF DEPENDENCE TOTAL %	MIN (%)	MAX (%)
COUNTRIES																					
ALGERIA		60.58			1.05	9.30						4.70	0.67		3.27	2.84	13.79	3.80	100.00	73.84	80.48
ANGOLA	19.45	9.76	29.66		6.75	5.95	1.91		2.37	5.97	0.71		3.74	2.94	0.96	0.82	3.89	5.12	100.00	92.15	98.09
BENIN	23.62	2.59	21.13	5.72	5.37	2.62	1.00	15.33		3.22	6.18		3.45	0.95		2.08	1.97	4.77	100.00	64.89	71.74
BOTSWANA	18.30	22.61		16.13	3.67	12.28						1.51			1.44	14.64	5.47	3.95	100.00	65.28	83.87
BURKINA FASO	10.55	0.99		35.70	4.70	1.36	27.29				8.51					6.89	1.44	2.58	100.00	22.84	32.31
BURUNDI	16.87	1.85	9.15	3.06	2.47	1.94			8.05	1.59		1.37	21.65	14.56		12.07	3.61	1.75	100.00	83.12	96.94
CAMEROON	14.89	7.11	13.82	10.50	3.79	5.41	1.81	0.69	13.21	5.76	3.18	1.93	2.07	1.60		9.69	2.57	1.99	100.00	69.56	81.24
CAPE VERDE	20.74	17.98	0.80		19.14	14.58			0.79			0.57				6.00	17.26	2.14	100.00	72.72	80.86
CENT AFR REP	9.33	5.63	27.84	4.24	1.49	0.93	1.28	10.04	5.34	4.05	8.66					11.37	6.75	3.06	100.00	67.24	81.67
CHAD	6.68	2.86	5.13	23.11	2.56	4.25	18.12	5.15			15.65		0.80	0.96		8.93	4.98	0.83	100.00	58.65	68.41
COMOROS(5)	2.10	3.86	14.74		41.47	3.73			8.63					3.21		6.77	13.60	1.89	100.00	91.34	100.00
CONGO DEM REP. OF	11.08	1.68	54.03	0.54	3.62	1.06		0.90	6.55	5.65	5.73		1.25	1.06		3.44	0.67	2.73	100.00	87.28	93.45
CONGO REP.	4.51	11.36	36.39		6.25	4.11		0.75	5.52	5.74	4.24	1.31	0.89	1.10	0.67	9.89	5.54	1.71	100.00	81.91	93.51
COTE DIVOIRE	10.18	5.16	13.13		23.31	3.70	1.44	14.19	8.31	6.35	3.42					4.86	1.22	4.72	100.00	52.92	62.50
DJIBOUTI(5)	1.15	27.82		1.16	24.53	29.81				6.02					0.50	4.91	0.75	3.34	100.00	90.59	98.84
ERITREA	3.44	37.82		22.80		0.88	9.06					5.25	0.60			15.76	2.18	2.23	100.00	49.06	67.05
ETHIOPIA	20.99	19.30		11.40		1.70	1.37	0.76				10.31	2.56			24.85	3.71	3.05	100.00	27.99	55.89
GABON	8.41	11.55	13.44		10.04	6.64		8.12	19.36	5.58	4.68	2.63				5.39	1.07	3.07	100.00	77.84	86.30
GAMBIA	5.51	4.43	0.79	2.67	30.82	22.60	14.30			2.79	5.71					3.22	6.03	1.12	100.00	62.17	66.51
GHANA	15.26	3.55	29.27	4.30	4.31	2.33	2.89	10.20	8.05	4.05	3.52					7.30	1.52	3.45	100.00	70.44	81.19
GUINEA	3.81	5.38	8.67		35.32	5.09		1.86	7.03	7.02	6.25			2.11		13.78	1.68	1.99	100.00	47.05	62.82
GUINEA-BISSAU	4.30	2.21	1.78	3.50	47.48	1.56	6.70		2.61	5.34	4.58					14.44	2.89	2.62	100.00	25.26	42.32
KENYA	50.74	7.70	4.61	1.17	2.57	10.53	0.57		2.16	6.99		0.55		3.02		4.37		5.03	100.00	88.86	98.26
LESOTHO	57.29	14.70		8.05	0.68	6.39						0.57				8.15	2.12	2.05	100.00	81.75	91.95
LIBERIA		3.06	28.76		28.64	2.47		1.57	4.77	17.93	0.74			1.15		6.40	2.05	2.45	100.00	60.94	69.79
MADAGASCAR	4.26	1.77	18.46		55.97	3.29			1.19	0.65	0.56		1.68	3.27		3.40	2.86	2.66	100.00	93.94	100.00
MALAWI	68.37	2.68	1.76		1.46	6.69			2.81		0.84		2.28			8.23	2.19	2.69	100.00	89.08	100.00
MALI	11.61	1.18		26.24	14.33	5.35	23.56				5.69					6.24	3.64	2.17	100.00	27.46	35.87
MAURITANIA	1.04	28.79		18.76	17.42	12.99	1.12			1.55						3.68	12.25	2.41	100.00	54.08	60.17
MAURITIUS	0.62	28.60			26.96	12.62					0.62	1.29			3.56	5.52	15.08	5.13	100.00	89.35	100.00
MOROCCO	4.44	44.76			0.55	11.59						8.80			2.06	12.26	10.82	4.72	100.00	58.13	75.11
MOZAMBIQUE	28.51	4.62	35.71	4.80	4.49	3.68	0.83		0.50	2.56	1.63			0.56		4.94	3.67	3.50	100.00	85.93	94.37
NAMIBIA(5)	17.45	12.26		2.26		17.10	15.72								3.84	31.11		0.26	100.00	50.65	82.02
NIGER	0.54	3.36	3.39	12.79	4.98	2.24	53.26			1.94	2.68					12.21	0.85	1.76	100.00	13.06	27.03
NIGERIA(5)	11.35	1.99	16.21	12.84	6.33	1.86	9.99	10.20	1.55	8.45	3.95					12.86	0.54	1.90	100.00	45.88	60.64
RWANDA	9.95	1.11	3.90	6.25	1.49	0.92			19.70	2.28			16.78	18.58		11.38	5.51	2.16	100.00	80.21	93.75
SAO TOME PRN(5)	11.50	20.69	2.52		14.36	8.28		0.74	6.61	5.77						10.32	19.07	0.14	100.00	83.03	93.49
SENEGAL	5.04	9.34	1.18	3.99	26.57	8.55	20.29			2.29	6.74					1.42	10.79	3.80	100.00	64.22	69.44
SEYCHELLES(5)	5.58	23.20			12.28	18.19			2.16		0.56	3.34			4.43	10.03	15.72	4.51	100.00	85.46	100.00
SIERRA LEONE	1.24	3.66	8.97	1.74	45.86	1.54	1.72		0.80	15.82	4.59			1.28		8.56	1.74	2.47	100.00	35.41	46.44
SOMALIA(5)	18.27	10.47	1.18	28.70	8.68	19.81			0.70				1.65			2.11	6.56	1.88	100.00	64.56	68.55
SOUTH AFRICA	38.96	18.63		2.32	4.14	13.08						1.25	0.93		8.50	4.65	4.09	3.45	100.00	89.58	97.68
SUDAN	0.87	19.39		42.79	2.01	8.06	5.75	0.62		2.15	4.61					6.15	4.45	3.13	100.00	38.18	47.46
SWAZILAND	15.33	23.54			6.97	24.96					1.46		0.79			20.83	3.93	2.20	100.00	76.97	100.00
TANZANIA	34.97	1.85	23.85	4.11	7.82	2.45	1.49		4.49	0.86	0.70		2.68	1.27		6.75	3.06	3.65	100.00	84.00	94.40
TOGO	30.68	3.66	15.83	9.76	5.34	2.00	5.47	9.05		4.51	2.49	0.59	1.87			2.24	2.01	4.50	100.00	63.64	70.38
UGANDA	9.67	0.72	11.19	2.35	1.20	1.54	7.39		27.23	0.74	2.22		6.89	11.48		9.36	5.08	2.94	100.00	75.73	88.03
ZAMBIA	64.79	4.01	10.14	1.22	0.55	8.25	1.07				0.88			0.80		3.89	1.91	2.48	100.00	91.34	97.71
ZIMBABWE	50.58	11.11	1.71	2.66	0.74	13.44	2.05		0.58		2.59		1.82		1.62	3.42	4.76	2.92	100.00	88.95	95.29

(1) Other crops not listed in this table. See annex No. 1 for a full description.
(2) Refers to *Oryza glaberrima* for the countries of West Africa
(3) Other crops in the FAO food balance sheets.
(4) Other crops not included in the analysis (contributing under 0.5%)
(5) Not members of the FAO Commission on Genetic Resources for Food and Agriculture

ASIA AND THE PACIFIC

TABLE NO. 2

FOOD ENERGY FROM CROPS (ASIA AND SOUTHWEST PACIFIC 1994)

PRODUCT	RICE	WHEAT	MAIZE	SUGAR	SWEET POTATO	RAPE & MUSTARDSEED	MILLET	SOYBEAN	SORGHUM	GROUNDNUT	OIL PALM	POTATO	BEAN	CASSAVA	COCONUT & COPRA	BARLEY	ORANGE	BANANA	C3(2)	OTHER(1)	C4(3)	DEGREE OF DEPENDENCE TOTAL %	MIN (%)	MAX (%)
COUNTRIES					FOOD ENERGY S	FOOD EN																		
AUSTRALIA	2.91	28.07	1.57	23.86		5.17		1.56				4.76			0.54	4.83	1.43	1.03	6.75	12.69	4.85	100.00	88.40	100.00
BANGLADESH	74.61	8.87		3.13		1.07		3.26			1.26	1.00							2.41		4.38	100.00	14.40	21.19
BRUNEI DARSM(4)	39.02	10.99	9.48	13.18						1.55	5.78		0.71	0.53	0.63				12.95	0.72	4.46	100.00	29.76	47.17
CAMBODIA (4)	84.03		3.39	1.75	1.00			0.70					0.80	0.59	0.74			1.15	2.32	0.62	2.92	100.00	7.09	12.33
CHINA	39.16	24.80	8.35	2.84	4.75	2.00	0.93	2.87	0.77	2.42		1.25				0.66			4.72		4.48	100.00	45.84	55.04
FIJI	21.58	26.17		13.12	0.58			9.97				1.60		3.32	9.39	1.21			7.72	0.53	4.81	100.00	64.96	77.49
INDIA	35.26	21.08	2.90	10.52		1.89	4.10	0.58	3.41	2.53		1.21	1.63	0.62	1.09			0.63	6.52	0.50	5.54	100.00	35.04	47.10
INDONESIA	56.32	4.76	5.75	5.38	0.91			4.19		2.01	5.61		0.64	5.11	4.80			0.69	2.39		1.46	100.00	28.97	32.82
JAPAN	29.84	15.49	7.05	8.52	0.59	4.71		8.87		0.68		2.29	0.80			3.03			11.81		6.33	100.00	43.15	61.29
KOREA DEM. PEOP. REP.	32.61	7.06	22.53	5.52	2.00			7.23				4.22				0.88			15.12	1.45	1.36	100.00	43.67	60.15
KOREA REP.	38.01	12.72	3.84	6.47				7.01			2.18	0.66			0.97	2.33	0.57		19.16	1.29	4.78	100.00	30.47	54.41
LAOS(4)	73.35		6.54	3.03	2.69							0.52		1.60					7.65	1.33	3.31	100.00	12.66	23.62
MALAYSIA	36.92	11.34	1.35	18.24				3.72		1.31	11.12		0.68	2.31	3.59			1.40	1.97		6.04	100.00	31.84	39.85
MALDIVES	27.13	25.49		21.47				2.87				0.51			8.50				11.71		2.32	100.00	37.37	51.40
MONGOLIA		76.24		16.67			1.08					2.03							0.95		3.02	100.00	94.95	98.92
MYANMAR	77.84	0.90	1.10	1.67			0.72			2.57	3.82		1.82		1.09				3.17	2.23	3.05	100.00	13.18	19.40
NEPAL	35.40	15.70	23.81	2.74		2.19	5.27	1.45			0.98	2.59				0.50			6.85		2.51	100.00	47.23	56.59
NEW ZEALAND	2.37	29.74	2.29	24.41	0.56	1.11		5.67		1.68		4.28			0.99	4.78		1.32	7.87	8.22	4.73	100.00	87.40	100.00
PAKISTAN	7.86	56.07	2.39	12.24		0.53		1.11	0.71		8.60	0.56							2.10	2.54	5.29	100.00	33.47	40.86
PAPUA NEW GUINEA	16.60	9.20		4.67	12.11			0.69			8.86			3.19	4.61	0.67		10.42	21.60	5.34	2.05	100.00	76.35	100.00
PHILIPPINES	41.53	12.15	7.08	14.39	1.23			0.55		0.71	1.33			2.43	4.24	1.24		1.87	7.38	0.90	2.98	100.00	27.61	37.97
SOLOMON ISLANDS	22.70	11.29		3.23	24.31										12.69	0.52			16.23	7.44	1.59	100.00	66.26	84.08
SRI LANKA	42.23	15.36	1.28	10.32									0.50	1.50	19.43			2.45	3.52		3.41	100.00	38.07	45.00
THAILAND	57.44	3.85		11.58				2.22		0.88	3.11		1.13	0.61	3.36			1.64	8.20	1.58	4.40	100.00	13.38	25.98
VANUATU	15.90	8.50		4.24				1.34		3.91		2.15			21.95			5.18	35.02		1.81	100.00	36.98	73.81
VIET NAM	74.40	1.76	3.31	2.94	3.04			0.68		0.56			0.51	3.56	2.07			1.39	3.45		2.33	100.00	13.42	19.20

(1) Other crops not listed in this table. See annex No. 1 for a full description.

(2) "Other" crops in the FAO food balance sheets.

(3) "Other" crops not included in the analysis (contributing less than 0.5%).

(4) Not members of the FAO Commission on Genetic Resources for Food and Agriculture

NEAR EAST

TABLE NO. 3																							
FOOD ENERGY FROM CROPS (NEAR EAST 1994)																							
					FOOD ENERGY SUPPLY (CALORIES/DAY) %																		
																					DEGREE OF DEPENDENCE		
PRODUCT	WHEAT	RICE	SUGAR	MAIZE	SOYBEAN	OIL PALM	POTATO	SUNFLOWER OIL	DATE	BARLEY	SORGHUM	GRAPE	TOMATO	OLIVE	ORANGE	BEAN	BANANA	C3(2)	OTHER (1)	C4(3)	TOTAL	MIN (%)	MAX (%)
																					%		
COUNTRIES																							
AFGHANISTAN	58.00	12.28	2.19	11.09			1.74			6.42		1.35						3.18	2.01	1.72	100.00	29.33	34.23
AZERBAIJAN	79.24		10.83				2.65						0.66					0.78	4.37	1.50	100.00	14.11	16.39
EGYPT	37.46	13.29	9.41	19.44	1.03		1.34	2.78	1.30		1.26	0.62	1.17		0.67			4.01	2.33	3.89	100.00	90.80	98.70
IRAN	52.96	10.55	9.01		6.39	1.11	3.22	2.00	1.42			1.54	0.54		0.93	0.58		5.67	2.49	1.58	100.00	91.21	98.46
IRAQ	35.49	14.93	8.66	2.93		12.98	1.56	2.49	2.81	9.45		1.09	0.92		0.62			3.59		2.49	100.00	83.38	89.46
JORDAN	49.66	5.90	15.40	2.16	2.18	5.19	1.69						1.25	5.04	0.84			3.86	1.42	5.40	100.00	20.64	29.90
KAZAKHSTAN(4)	54.76	7.82	9.91				6.86	5.90										0.51	12.43	1.80	100.00	42.33	44.64
KUWAIT	26.03	22.62	15.26	4.14	1.70	4.18	1.73	0.53				0.53	1.06	1.26	0.91		0.89	11.08	4.07	4.01	100.00	83.65	98.74
KYRGYZSTAN(4)	60.75		16.21				6.50			2.73			0.72					0.71	11.52	0.90	100.00	23.39	25.00
LEBANON	35.05	3.64	9.94		7.10		3.93					3.40	1.23	2.98	1.56	0.88	0.69	19.08	4.89	5.64	100.00	33.85	58.57
LIBYA	41.86	5.38	10.13	8.77	0.98		1.65	6.91	1.63	2.85			1.15	4.15				10.63	0.52	3.40	100.00	67.21	81.24
SAUDI ARABIA (4)	36.24	10.89	14.90	1.74		10.47	1.32		5.92		4.44	0.82	0.78		0.74		0.82	6.59	0.61	3.72	100.00	82.95	93.26
SYRIA	57.93	3.04	11.59	0.54	1.15		1.26	1.35		0.78		1.24		4.99	0.61			6.24	6.22	3.06	100.00	14.17	23.47
TAJIKISTAN(4)	71.76	1.85	9.72		0.82		2.65						0.70					1.14	10.66	0.70	100.00	15.74	17.58
TUNISIA	51.47	0.66	10.08		12.90	0.56	1.72		0.75	1.33			0.85	5.55				8.97		5.17	100.00	68.90	83.04
TURKMENISTAN(4)	70.42	7.20	7.49				1.73					1.37	0.73					1.32	8.83	0.90	100.00	17.16	19.38
UNITED ARAB EMIRATES (	20.34	23.90	12.77	4.97	2.21		1.90		5.41			1.24	1.67	1.19	1.45		0.97	12.31	5.77	3.91	100.00	83.78	100.00
UZBEKISTAN(4)	67.57	6.11	6.41		0.78		2.54						0.99					2.16	12.75	0.70	100.00	16.82	19.68
YEMEN	51.07	4.61	10.40	2.10		7.90	1.23				12.34	0.93						3.22	2.10	4.10	100.00	40.68	48.00
(1) Other crops not listed in this table. See annex No. 1 for a full description.																							
(2) "Other" crops in the FAO food balance sheets.																							
(3) "Other" crops not included in the analysis (contributing less than 0.5%).																							
(4) Not members of the FAO Commission on Genetic Resources for Food and Agriculture																							

EUROPE

TABLE NO. 4

FOOD ENERGY FROM CROPS (EUROPE 1994)

FOOD ENERGY SUPPLY (CALORIES/DAY) %

PRODUCT	WHEAT	SUGAR	POTATO	SUNFLOWER OIL	RYE	BARLEY	SOYBEAN	OLIVE	MAIZE	RAPE & MUSTARDSEED	GRAPES(WINE)	RICE	APPLE	PALM OIL	TOMATO	GRAPES	ORANGE	BANANA	BEAN	C3(2)	OTHER(1)	C4(3)	DEGREE OF DEPENDENCE TOTAL %	MIN (%)	MAX (%)
COUNTRIES																									
ALBANIA	53.30	7.68	1.72	7.94		1.09	1.32	1.81	9.67			3.48	0.68		1.08	0.90			2.08	4.62		2.63	100.00	92.07	99.32
ARMENIA	70.70	7.99	9.75	0.88							0.86		1.85		1.98	1.68				3.57		0.73	100.00	85.86	90.16
AUSTRIA	22.63	16.65	3.72	4.36	5.23	7.10	3.05		1.98	7.82	2.70	2.42	2.46			0.52	1.05	1.04		10.06	0.66	6.54	100.00	80.94	97.54
BELARUS(4)	21.96	14.76	12.86	3.24	30.13	1.31				1.56			2.00							7.73	3.09	1.36	100.00	44.02	53.11
BELGIUM-LUXEMB	28.20	14.75	7.28	2.42		6.08	4.03		3.02	2.75	1.92	1.60	2.27	3.12			0.97	1.11		10.98	5.00	4.49	100.00	82.26	97.73
BOSNIA HERZG	32.61	3.04	4.17		0.54	3.14			40.48										2.27	11.76		1.98	100.00	85.72	99.46
BULGARIA	49.68	13.82	2.15	13.04		3.41			0.50		0.51	2.01	0.64		1.02	1.04			0.97	7.19		4.00	100.00	88.17	99.36
CROACIA	31.95	16.05	9.59	5.33		5.51	3.46	1.01	2.26	2.02	5.74	0.86	1.01			0.69	0.59	0.89		9.54	1.07	2.43	100.00	87.02	98.99
CYPRUS(5)	35.57	16.07	3.84	2.07		2.62	6.46	5.09	3.61	2.10	2.37	1.91			0.76	0.59	1.03	0.62	1.21	7.93	2.82	3.33	100.00	78.93	90.19
CZECH. REP.	30.79	14.00	6.98	2.34	2.60	9.49	3.17			14.85	0.59	1.42		1.32			0.63	0.64		5.21	1.65	4.32	100.00	87.87	97.40
DENMARK	25.64	21.77	5.71	0.77	6.61	7.64	4.42		3.81	1.81	2.10	1.20	1.43	1.04		0.68		0.54		7.23	4.06	3.55	100.00	81.18	91.96
ESTONIA	45.98	14.73	13.35	9.84	3.65	0.56	0.62						1.22							4.87	1.57	3.60	100.00	86.66	95.13
FINLAND	22.13	21.70	8.12	1.26	8.39	7.41	2.34			6.97	0.56	3.42	1.01		0.51	0.60	0.71	1.20		8.40	3.61	1.63	100.00	88.96	98.99
FRANCE	32.74	15.41	5.61	7.87		2.08	1.43	0.84	4.67	3.07	5.42	1.85			0.53		0.73			10.72	2.64	4.40	100.00	75.55	90.67
GEORGIA	67.76	9.26	5.36	5.36					6.08		1.45		0.57		0.94					1.72	0.80	0.70	100.00	18.54	20.96
GERMANY	23.59	15.37	6.13	3.20	4.92	8.45	8.68		1.93	3.51	2.08	1.13	1.54	1.31		0.66		0.93		9.54	1.47	5.56	100.00	83.36	98.46
GREECE	33.77	12.12	5.31	3.40		1.71		16.55	1.47		1.03	1.75	1.10		2.32	1.36	0.94		0.99	10.91	1.47	3.79	100.00	54.24	68.94
HUNGARY	39.46	18.32	4.63	9.38		4.96			0.72	2.22	2.68	2.42	1.96	1.56				0.51		6.04		5.15	100.00	86.85	98.04
ICELAND	24.33	28.26	5.17		2.02	7.28	5.68	0.60			0.79	1.29	0.79			0.91	0.77	1.21		11.57	5.53	3.82	100.00	83.82	99.21
IRELAND	32.50	17.47	9.09	3.08		7.97	1.48		4.59	4.00		0.89	0.55			0.64				9.12	2.86	5.74	100.00	84.59	99.45
ISRAEL(5)	38.94	15.81	2.98	0.54		0.69	11.41	0.55	1.73	0.95		3.00	0.65	1.15	1.07	0.73		0.94	0.55	10.12	3.85	4.32	100.00	27.89	42.33
ITALY	39.42	9.19	3.11	3.77		1.31	3.46	11.18	2.50	1.13	4.29	2.27	1.33	0.67	1.16	0.86	1.47	0.55	0.59	7.38	1.34	3.01	100.00	70.82	81.21
LATVIA	27.06	18.28	10.47	3.55	15.08	9.04	2.27			1.73		0.61	2.14							6.19	0.51	3.08	100.00	81.15	90.42
LITHUANIA	42.10	10.65	8.48	10.84	17.47	2.11							2.13							3.14		3.07	100.00	91.66	97.87
MACEDONIA(4)	45.64	10.16	2.37	4.87		1.56	4.88		1.63		2.02		0.84		0.94	1.15			1.96	18.69	0.58	2.71	100.00	67.60	89.00
MALTA(5)	40.57	20.11	2.77	2.42		2.80	6.64		0.65		0.73	1.89	0.74		1.13	1.12	0.61	0.71	0.90	9.29	2.39	4.51	100.00	84.35	98.15
MOLDOVA REP(4)	50.52	13.25	7.05	7.86	0.85	1.03	0.52		11.13				1.59		1.19					2.81	0.51	1.68	100.00	80.67	85.16
NETHERLANDS	22.25	23.74	7.02	1.18		4.90	7.54		0.80	1.18	1.19	1.97	1.51	6.26		0.98	1.12	0.55		6.66	7.26	3.89	100.00	87.94	98.49
NORWAY	33.93	19.41	6.78	0.76	2.89	6.09	9.80			1.03	0.66	1.50	1.06	0.52		0.68	1.16	1.02		5.11	4.42	3.16	100.00	90.67	98.94
POLAND	36.31	17.21	10.51	1.32	10.76	3.21	2.85			5.55		0.70	0.68	1.01						5.54	0.62	3.72	100.00	90.06	99.32
PORTUGAL	28.74	11.31	8.80	3.92	1.49	3.09	4.72	3.65	2.86		4.29	6.35	1.18	3.27	1.02		0.81	0.88	1.05	8.75	0.55	3.27	100.00	78.86	90.88
ROMANIA	44.44	10.46	4.93	7.57		2.46			15.90		1.66	1.11	0.56		0.54	0.64				5.63	0.65	3.47	100.00	90.34	99.44
RUSSIA FED	50.28	15.03	10.44	4.39	4.09	0.98	1.43					0.93	0.65							6.05	2.28	3.47	100.00	23.09	32.61
SLOVAKIA	41.79	14.43	6.06	4.22	3.40	6.48				3.86	0.64	1.49						0.69		8.09	5.44	3.41	100.00	85.10	96.60
SLOVENIA	29.42	5.76	9.44	10.15	3.54	3.90	2.43		15.79	2.46	3.11	1.10	1.19				0.65	0.83		5.00	1.41	3.82	100.00	89.99	98.81
SPAIN	27.11	12.59	7.53	9.40		3.71	3.22	11.82			2.46	2.97	0.88		0.86		1.26	0.67	0.78	8.57	1.31	4.86	100.00	71.41	84.84
SWEDEN	23.51	23.53	7.14	0.88	4.99	4.50	1.76		1.00	2.97	1.68	4.81	1.30	4.06	0.70	0.62	0.95	1.54		6.44	4.14	3.47	100.00	88.79	98.70
SWITZERLAND	29.60	18.15	4.02	5.11		3.98	1.30	0.61	0.63	4.22	3.80	2.49	1.57	1.08	0.64	0.90	0.76	0.78		11.77	3.72	4.87	100.00	81.79	98.43
TURKEY(5)	52.40	8.92	3.48	5.96	0.58		1.34	2.04	2.61			1.61	1.07	2.57	1.08	1.82			0.77	8.21	2.79	2.74	100.00	32.21	43.16
UKRAINE(4)	51.44	16.29	9.92	6.22	3.98	0.96							1.15							4.18	3.04	2.81	100.00	75.57	82.56
UNITED KINGDOM	30.05	17.88	9.10	3.07		6.56	2.63		1.28	9.25	1.19	1.05	0.90	1.86		0.93		0.72		4.90	3.67	4.97	100.00	89.23	99.10
YUGOSLAVIA	44.82	11.90	2.98	12.56		2.93	1.50		6.92		2.53		0.83						2.18	7.80	0.82	2.22	100.00	89.15	99.17

(1) Other crops not listed in this table. See annex No. 1 for a full description.

(2) "Other" crops in the FAO food balance sheets.

(3) "Other" crops not included in the analysis (contributing less than 0.5%).

(4) Not members of the FAO Commission on Genetic Resources for Food and Agriculture

(5) These countries participate in the meetings of the FAO Commission on Genetic Resources for Food and Agriculture with the European Group

LATIN AMERICA AND THE CARIBBEAN

TABLE NO. 5

FOOD ENERGY FROM CROPS (LATIN AMERICA AND THE CARIBBEAN 1994)

FOOD ENERGY SUPPLY (CALORIES/DAY) %

PRODUCT	SUGAR	MAIZE	WHEAT	RICE	SOYBEAN	BEAN	CASSAVA	SUNFLOWER OIL	POTATO	PLANTAIN BANANA	BARLEY	PALM OIL	ORANGE	C3(2)	OTHER(1)	C4(3)	DEGREE OF DEPENDENCE TOTAL %	MIN (%)	MAX (%)
COUNTRIES																			
ANTIGUA BARB	17.06	1.81	28.02	5.51	5.51				1.37		1.21			34.56	2.03	2.92	100.00	62.54	100.00
ARGENTINA	15.70	1.73	38.69	1.88	2.95			13.54	4.63	0.82	1.43		1.04	6.76	6.34	4.49	100.00	88.74	95.37
BAHAMAS	20.20	1.31	19.53	11.59		0.70			0.83	2.20	1.91			36.38	1.55	3.79	100.00	59.12	100.00
BARBADOS	18.72	5.95	20.81	14.22	7.51				3.65		1.79		0.69	15.57	5.99	5.11	100.00	79.33	100.00
BELIZE	25.75	8.20	24.11	10.44	0.68	5.12		1.13	1.08		1.50		3.26	10.76	5.42	2.56	100.00	81.52	100.00
BOLIVIA	16.01	12.38	25.14	12.55	4.19		2.44	1.69	5.48	4.76	1.27		0.72	8.36	1.60	3.41	100.00	81.16	92.92
BRAZIL	21.28	7.55	13.26	18.82	13.84	6.65	5.01		1.10	2.23	1.22	0.66		2.12	1.47	4.79	100.00	80.81	94.36
CHILE	19.68	3.48	43.21	3.62	6.63			4.02	4.83	0.77	1.01			9.89		2.85	100.00	86.46	94.37
COLOMBIA	22.51	14.50	8.99	14.53	3.11	1.75	3.86		5.55	7.78	1.27	6.33		4.13	0.89	4.80	100.00	83.77	94.45
COSTA RICA	26.17	7.37	11.77	19.36	6.96	4.85			1.11	3.57	1.54	8.18	0.59	4.04	0.55	3.95	100.00	79.74	96.00
CUBA	28.74		25.74	14.83	2.74	0.94	2.77	0.60	1.89	2.19	0.66	2.63	1.44	9.43	3.20	2.21	100.00	87.43	97.23
DOMINICA	20.14	1.98	28.49	6.01	3.73		0.56			3.38	0.57		1.49	16.84	14.99	1.82	100.00	81.36	100.00
DOMINICAN REP.	20.50	6.22	11.92	16.47	11.22	2.66	2.19	1.85		9.26	2.01			6.50	5.45	3.75	100.00	87.14	97.81
ECUADOR	16.47	2.37	9.19	27.74	3.61	1.21	0.61		3.46	12.93	0.50	15.53		2.62		3.75	100.00	88.91	96.54
EL SALVADOR	15.61	32.29	17.66	4.14		5.10	0.84			0.93	0.68		0.71	3.14	14.40	4.51	100.00	50.05	62.79
GRANADA	21.19	2.10	24.32	8.11	2.88				0.78	2.92	0.64		0.61	21.35	10.27	4.84	100.00	73.85	100.00
GUATEMALA	18.75	49.78	13.28	1.75	2.24	3.91		1.21						3.03		6.06	100.00	37.72	49.32
GUYANA	13.22		22.26	38.13	0.53				0.55	4.05	0.84		0.58	7.69	10.15	1.99	100.00	90.31	100.00
HAITI	16.49	11.21	10.16	18.60	2.13	5.21	4.82			5.42		1.07		10.89	12.56	1.43	100.00	82.50	95.18
HONDURAS	18.29	41.48	9.89	4.29		3.28				5.82	0.65	9.62		0.63	1.11	4.94	100.00	49.71	58.52
JAMAICA	21.21	2.93	23.11	10.11	8.11					2.87	1.42		0.72	7.09	18.02	4.41	100.00	87.64	99.13
MEXICO	18.32	40.52	12.07	2.10	4.79	4.93		2.36	0.83	1.42	1.76	0.55	0.90	4.23		5.22	100.00	45.12	59.48
NICARAGUA	17.54	24.22	7.90	17.80	6.54	5.97	0.81		0.83	0.77			0.54	1.93	12.27	2.88	100.00	62.37	74.97
PANAMA	15.48	11.72	15.08	27.30	9.76	0.53	1.11		0.54	4.35	2.51			6.01	0.73	4.88	100.00	75.73	87.17
PARAGUAY	11.90	20.57	7.96	8.35	2.99	4.17	17.37	2.14		1.09	3.36	2.00	1.58	5.36	6.53	4.63	100.00	66.99	81.12
PERU	18.31	6.10	19.29	21.61	5.65	0.87	2.28		6.06	2.83	2.41	1.16		6.22	2.13	5.08	100.00	80.43	92.62
SAINT LUCIA	18.37	0.57	27.71	9.67		0.70	0.85		0.91	6.58	2.74		0.64	16.77	12.21	2.29	100.00	80.23	99.15
ST KITTS NEV	19.85		29.38	14.47	8.39	0.54			1.01		2.43			13.39	7.38	3.16	100.00	82.87	100.00
ST VINCENT	19.67	7.20	14.62	19.44	0.79					4.01				19.31	12.15	2.81	100.00	77.89	100.00
SURINAME	14.72		19.42	37.52	5.69		1.59		3.55	4.92	1.58		1.14	2.38	4.89	2.60	100.00	95.02	98.41
TRINIDAD TOB	22.72	1.87	24.64	16.58	10.15				1.70		0.73			9.80	7.57	4.24	100.00	86.00	100.00
URUGUAY	18.62	8.61	33.88	5.38	1.58	0.61		8.17	4.97	1.24	1.68			4.70	6.07	4.49	100.00	90.19	100.00
VENEZUELA	17.83	22.35	17.82	7.00	7.93	1.77	1.21	4.48	1.07	5.40	2.68	0.79	0.79	4.45		4.42	100.00	88.31	98.93

(1) Other crops not listed in this table. See annex No. 1 for a full description.

(2) "Other" crops in the FAO food balance sheets.

(3) "Other" crops not included in the analysis (contributing less than 0.5%).

NORTH AMERICA

TABLE NO. 6																								
FOOD ENERGY FROM CROPS (NORTH AMERICA 1994)																								
					FOOD ENERGY SUPPLY (CALORIES/DAY) %																			
																						DEGREE OF DEPENDENCE		
PRODUCT	WHEAT	SOYBEAN	SUGAR	BARLEY	POTATO	MAIZE	RICE	GROUND-	APPLE	RAPE &	BEAN	ORANGE	OAT	TOMATO	BANANA	COTTON-	GRAPE	GRAPE	C3(2)	OTHER(1)	C3(3)	TOTAL	MIN (%)	MAX (%)
								NUT		MUSTARDSEED						SEED OIL		(WINE)				%		
COUNTRIES																								
CANADA	27.55	1.81	19.72	3.48	4.86	1.86	2.77	1.84	1.15	12.68		1.07		0.78	0.99	0.52	0.76	0.56	11.55	2.10	3.93	100	84.00	99.48
UNITED STATES	24.75	14.15	12.46	4.71	3.96	4.80	2.92	1.74	1.50		1.24	1.13	1.17	0.83	0.77	0.70	0.52		17.55		5.09	100	77.36	100.00
(1) Other crops not listed in this table. See annex No. 1 for a full description.																								
(2) "Other" crops in the FAO food balance sheets.																								
(3) "Other" crops not included in the analysis (contributing less than 0.5%).																								