The exploitation of plant genetic information: Political strategies in crop development

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Chapter 6

International Division of Labour in Crop Development: Implications for Chile and Colombia

In the previous chapter we examined the main tendencies in crop development that seem to give shape to the emerging Third Agro-Food Order. We have shown that a small number of industrial conglomerates is replacing the state as main organizer of crop development. They have successfully influenced the strategies for conservation and IPR protection, which have a worldwide impact. However, being the dynamic force of crop development, the industrial conglomerates meet with considerable opposition, not only in the OECD but also in developing countries.

In the international division of labour in agriculture, developing countries generally take a position that is different from most OECD countries. Overall in developing countries, the level of industrialization of the agricultural sector is lower than in OECD countries, which is reflected in a lower productivity and a larger part of the population depending on agriculture. As a result, the share of developing countries in the world's imports of some major staple crops has continuously increased in the past, while the share of OECD countries in the world's agricultural exports has risen (two tendencies that we have shown earlier).

In crop development there are also wide differences. The industrial crop development conglomerates have their home base invariably in one of the OECD countries, while nearly all genetic engineering research takes place in these countries as well. In developing countries, the main breeding organizations are generally public institutions, whose budgets have been reduced in the past decade. As the domestic private breeding industry is not very well developed in these countries, the role of national government in crop development tends to be taken over by the transnational industrial conglomerates, at least for a number of commercial staple crops. Considering these rough indications of differences in agricultural production capacity between OECD and developing countries, it is obvious that the effects of the prevailing agricultural production strategies, including specific crop development policies, will be different for both groups of countries as well.

In this chapter we examine the agricultural sectors of two Latin American
countries, Chile and Colombia in more detail. We explore their specific position in the international division of labour in agriculture and in crop development. Some of the major political dilemmas in the agricultural production strategy since the 1980s are discussed. The main argument we develop in this chapter is that at the root of controversies on conservation and IPR protection lie rival views on how the agricultural sector should be organized. It is the increasing economic marginalization of the poorest rural population that constitutes the basic reason for opposition to conservation and IPR protection policies.

The chapter consists of three sections. In the first, we explain three agricultural production strategies and relate them to the various agricultural sectors and policies in Chile and Colombia. Then we focus on the question of how the various production sectors and agricultural policies are related to respectively conservation and plant-related IPR protection policies.

6.1 Conflicting interests in the organization of agriculture

Those who travel through rural Colombia will experience great contrasts in agricultural production. The sight of large, well-equipped flower production plants and extensive plantations near Bogotá is soon replaced by one of very poor subsistence farmers in more mountainous regions. Similar contrasts can be found in Chile. In this chapter we argue that the main causes for the PGR conflict must be sought in these contrasts. The present section is devoted to the question of how these large differences in agricultural production can be interpreted.

We start off with a discussion on the agricultural production strategies in the Third Agro-Food Order; strategies which refer to the more or less consistent sets of policies for the organization of agriculture. In OECD countries most agriculture follows one fairly uniform, usually highly industrialized production strategy. In Chile and Colombia, and in most other developing countries, the picture is far more fragmented: agriculture follows more than one production strategy, and the advocates of each strategy have a particular view on how conservation and IPR regulation should support agriculture.

6.1.1 Three agricultural production strategies

In the first chapter of this book we distinguish three alternative and conflicting strategies for the organization of agriculture: ‘market-led’ and ‘state-led’ agro-industrialization strategies, and a third strategy directed at non-industrial, farmer-oriented agricultural production (Figure 6.1). These rival strategies must be interpreted as ideal-types in the Weberian sense. They are an exaggeration of some essential features of agricultural production strategies of public and private organizations. The strategies encompass all socio-economic, technological and legal policies that are intended to speed up, steer, or slow down the process of agro-
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internationalization, or to support non-industrial agriculture. The typology is helpful to understand the political differences of opinion about how agriculture should develop and, consequently, what crop development policy should be followed.

The first strategy is directed towards a *market-led industrialization* of agriculture, i.e. the transformation of natural and farm processes into technical and industrial processes at a pace and along lines set by the market. The state has a facilitating role in speeding up the transformation process. The strategy is global in its orientation. The world is perceived as if it were one global agro-food enterprise in which production and distribution are effectively to be organized through the market. To this end, the agricultural sectors of the individual countries should specialize and compete on the basis of their comparative advantages, while agricultural trade should be unhindered by national political interference. National crop development should be based on all the scientific information that is internationally available. It should focus on the improvement of productivity and quality of those crops that can be produced nationally against international competitive prices. Research on crops that can be imported at lower costs should be avoided. In the market-led production strategy a prominent position in “feeding the world” is being attributed to the transnational agro-industry. Concern for environmental degradation is directed to the “carrying capacity of the earth”. Genetic engineering is expected to play a major role in making agriculture more sustainable.

The second strategy is directed at a *state-controlled industrialization* of agriculture and implies a prominent role of the national state in the organization of agricultural production. Governmental involvement is led by the national political agenda, in which a broad variety of national producer and consumer interests are taken into account. The steering role of the government may take two directions. On the one hand, some developments in agro-industrialization may be slowed down in order to avoid social costs, such as the too rapid elimination of farms, the risk of national food shortages, or concern about health aspects of genetically modified food. On the other hand, governments may encourage politically desirable industrial developments by funding agricultural research, offering tax benefits, etc.. In the state-led strategy, crop development is focused on raising the productivity and quality of those crops that are considered to be important for national farmers and consumers. Internationally available and nationally accepted technology is utilized to this end. Nature is valued as a source of economic development, which should be exploited according to the national political agenda.

The third strategy is directed at a *non-industrialized, farmer-oriented agriculture*. It is the strategy that focuses on the maintenance and improvement of small-scale farming systems, and is in support of farmers who have been marginalized during the process of agro-industrialization. This strategy aims at more farmer autonomy in agricultural production by avoiding dependence on the use of external, industrial inputs. The maintenance of rural agricultural production capacity is considered to be essential for reasons of local food security. Crop development must be directed to specific local needs and tastes, as well as from native crops and other locally available natural resources. The concept of nature seems to be
ambiguous within this strategy. Nature and farm-oriented NGOs in developing countries who support this strategy tend to value nature as the material basis for life and survival, and as the spiritual environment for culture and religion. Nature and farm-oriented organizations in OECD countries, however, tend to value nature as the eco-system on which humanity depends and as the antithesis of the urban, profit-led civilization. Farming communities that operate in semi- or non-industrialized production systems, especially those located within 'centres of genetic diversity', are valued as custodians of the world's biodiversity.

The conflicts between the respective strategies are relatively modest overall in OECD countries compared to developing countries. As most agriculture in OECD countries is integrated into the agro-industrial market economy, political support for non-industrialized agriculture is marginal. The support for this strategy can mostly be found with nature and farm-oriented NGOs, and donor organizations that focus on non-industrialized agriculture in developing countries. In OECD countries, the political controversy is basically between the market-led and state-led strategies. Judging from publications and Internet homepages, the market-led strategy is strongly promoted by, for example, transnational agro-industry organizations, such as the International Agri-Food Network\(^2\) (IAN) (IAN, 1998), the Biotechnology Industry Organization (BIO) in the USA (BIO, 1998), and its European counterpart EuropaBio (EuropaBio, 1998), and also by organizations such as the World Bank (Barghouti et al., 1993) and the International Chamber of Commerce (ICC, 1997).

We indicated in the previous chapter that the market-led agricultural production strategy has prevailed in OECD countries since the 1980s. It has mainly been challenged in Europe, where farm and consumer organizations have tried to steer and slow down some trends in the ongoing agro-industrialization promoted under the Common Agricultural Policy. European farmers have regularly blocked roads or dumped their produce by way of protest against the absence of more supportive and protective measures. There is also considerable resistance against the patenting of plants and animals, as was illustrated by the ten-year struggle over the EC's biotechnology directive. Furthermore, the introduction of genetically modified organisms seems controversial everywhere in Europe (Flynn et al., 1998). Nevertheless, compared to the situation in some developing countries, the social conflicts that emerge in OECD countries from political choices regarding the agricultural production strategy remain relatively insignificant. Large-scale social unrest in this respect has hardly occurred. The financial compensation schemes, and alternative employment opportunities for farmers that are forced to retire prevent the social cost incurred by farmers from being too high. Furthermore, the number of people that translate their concern about developments in biotechnology into political action is relatively small.

In many developing countries, the situation is the opposite. Agriculture is usually much more important, both in terms of contribution to the GNP, and number of people who rely on the national agricultural sector for their income or food supply.
Moreover, developing countries generally hold a weaker position in the international division of labour in agriculture than do OECD countries. This mixture implies that choices related to agricultural production strategies may have a strong impact on the population, and therefore may be very sensitive politically. By way of example, we will explore the political dilemmas and conflicts over the rival production strategies in Chile and Colombia.

6.1.2 Agricultural policy in Chile and Colombia

Both in Chile and Colombia, the conflicting interests in agricultural production became prominent with the *apertura*, the opening of the national market. The *apertura*, introduced in Chile in the late 1970s and in Colombia in the late 1980s, gave way to a more market-led agricultural production strategy. In both countries, state involvement in agriculture was reduced or redirected. Import tariffs, quantitative import restrictions, price support, government procurement, and funding of public agricultural research institutes were lowered or abandoned. At the same time, national trade-related laws in areas such as investment and intellectual property protection, were adjusted to international standards to promote private investment.

During the trade liberalization of the two Latin American countries, the state-led import substitution policy was replaced by an export orientation as a new economic development strategy. The opening of the market facilitated access to foreign technology, such as plant varieties and agro-chemical inputs, and offered better export opportunities. These opportunities predominantly have a hemispheric and a regional dimension.

Closer hemispheric economic integration is pursued within the framework of the North American Free Trade Agreement (NAFTA), of which both Chile and Colombia wish to become members. NAFTA is of great importance to the expansion of Chile’s exports, especially when taking into account the fact that the total value of the Chilean agricultural exports declined from US$ 3.3 billion in 1995 to 2.9 billion in 1997 (ODEPA, 1998). The country is a major exporter of fresh fruit, wine, cellulose, and wood, a large part of which is marketed in the USA and Canada. NAFTA is of equal importance to Colombian exporters of cut flowers, vegetables, and tropical fruit. Colombia is the world’s second largest cut flower exporter. Around 80 per cent of the cut flower export is sold in the USA (ASOCOLFLORES, 1994). Much is expected of the production of asparagus, mango and some tropical fruit juices. Tropical fruit is considered to be the Colombian export flagship of the next century (CCL, 1994).

Closer regional economic integration is the second major objective of the *apertura*. Colombia is a member of the Andes Pact (with Venezuela, Ecuador, Bolivia and Peru) and is supposed to enjoy a comparative advantage in agriculture in relation to the other Pact members. Colombia accounts for 60 per cent of the farm output produced by the Andes Pact. Colombian potato and sugar cane production in particular has regional export potential (World Bank, 1996:16). The regional eco-
nomic integration aspirations of Chile materialize within the framework of the Mercado Común del Sur (MERCOSUR), the free trade group of Argentina, Brazil, Paraguay, and Uruguay, of which Chile is an associate member. As regards the agricultural sector, MERCOSUR is assumed to entail fewer benefits than NAFTA (Quiroz, 1996:128). Public potato breeders, however, foresee a bright future for the export of both fresh and seed potato in the region (interview Lopez, 1996).

The economic liberalization in Colombia and Chile may be advantageous to agricultural exporters, but it has had a severe impact on producers of staple crops destined for the national market, such as rice, cotton, barley, and wheat. The lowering of protective measures allowed cheaper imported food to compete directly with nationally produced food, sometimes with devastating results for national farmers. Both in Chile and Colombia, the share of imports relative to national production of the main food crops has grown quickly in the past decade (Figures 6.2 and 6.3). In fact, the economic liberalization burdened an agricultural sector that was already under pressure. The position of the national producers has deteriorated due to periods of drought (in Colombia in 1992/93, and in Chile in 1996), and because of monetary measures such as a revaluation of the national currency, making national production even more expensive in relation to imports (Muchnik, 1996:122). Moreover, Colombian producers have to cope with dietary changes in their country, in which traditional food is gradually being replaced by industrially processed (Western) food. This development entails a decreasing demand for national crops, notably rice, while the demand for wheat and potato-based food is increasing (interview Moscardi, 1996). The expansion of domestic demand for products that can more cheaply be imported put enormous pressure on the national farming sector. Finally, the agricultural sector in Colombia is suffering badly from the rural violence caused by guerilla forces and cocaine producers.

Figure 6.2 Maize and wheat imports in percentage of national production in Chile (1990 - 1996)

(data derived from FAOSTAT, 1998)
The combination of economic liberalization with uncontrollable climatic, political and cultural circumstances has confronted the Chilean and Colombian governments with a major dilemma. In both countries only a handful of agricultural subsectors is equipped to compete on the international market. The majority of the rural population, which still constitutes a large part of the population, is by no means prepared to compete with farmers from, for example, Argentina or the OECD countries. Many farming families were already living in poverty before the economic liberalization set in, and their number is growing. In Colombia even one third of the rural population is found to be “extremely poor” (World Bank, 1996:5), and it is beyond doubt that the violence caused by the guerillas and the narcotraficantes is rooted in the hopeless situation in the countryside.

Nevertheless, a return to protectionist economic policies has in the past years been considered neither by the succeeding Colombian governments, nor by the democratically elected governments in Chile. The policy to combat poverty in these countries has been a continuation of liberalization and of agricultural rationalization, although it is intended to give the market-led strategy a “human face” (Kay, 1996:4). The titles of some recent key publications on agricultural policy illustrate the prevailing intention that a strengthening of agricultural competitiveness is to be accompanied by alleviation of rural poverty (cf. Gozales and Jaramillo, 1994; World Bank, 1995). Import tariffs up to 30 per cent have been maintained for most crops in Colombia (World Bank, 1996:72), while the import of rice from Vietnam and Thailand has been prevented (interview Sanabria and Dabalos, 1996). In Chile, wheat, rice, maize, and oil crops have also enjoyed some form of protection and are excluded from hemispheric and regional trade agreements (Muchnik, 1996:117,119).

In both countries development programmes have been set up to equip small farmers better to conditions of the more open market. In the early 1990s, the Colombian government and private industry jointly designed crop diversification
programmes to encourage small farmers to produce promising crops, such as vegetables, fruit and pulses, instead of wheat and barley, sisal, and cotton (interview Alvarado, 1996). The Colombian government terminated its support for the latter crops, on the grounds that Colombia has no competitive advantages in their production. The major consumers of wheat and barley, the Colombian millers and breweries, preferred to import these products, for reasons of price and quality (interviews Alvarado, 1996; Quintana and Pordnia, 1996). In another programme, the government attempted to improve access to land. In collaboration with the World Bank a programme was designed to help 70,000 landless farm families to purchase land by a 70 per cent price subsidy. It is probably illustrative of the severity of the rural problems in Colombia that neither the crop diversification programme, nor that on land access, has been successful so far. Effective crop diversification is hindered, among other things, by the poor condition of the roads in Colombia which do not allow for adequate transport of perishables from remote rural areas to the large city markets (interview Isaacs, 1996). The land access was not functioning well, because only one hundred families were able to borrow the remaining 30 per cent (on top of the 70 per cent subsidy) (Anonymous, 1996a).

In Chile, the democratic governments since 1990 have designed a distinct policy to strengthen the small-farmers sector, a policy referred to as the reconversión. It focuses on the increase in productivity of traditional crops, on improving processing and marketing, and on diversification away from traditional crops to forestry activities, livestock rearing or non-traditional export products, such as cut flowers (Kay, 1996:16-19). In principle the reconversión is aimed at all farmers, but a distinction is made between ‘viable’ and ‘non-viable’ farms. This is an important aspect of government intervention in agriculture and a well-tried policy in the USA and Europe. The Chilean government is actually limiting its support to farmers who have the potential to establish a farm that generates at least a family income. All other farm units, the minifundistas, are in fact ruled out by the conditions which farmers have to meet in order to receive technical assistance (Kay, 1996:14-20).

6.1.3 Conflicting agricultural production strategies in Chile and Colombia

When we compare the agricultural policies followed since 1990 in the two Latin American countries with the typology of production strategies presented above, we find a combination of elements from the market-led and the state-led strategies. In both countries, the government has actively pursued a further industrialization of the national agricultural sector. Although not being involved itself in the production of cut flowers, fresh fruit or wood, the government paves the way for private expansion in this area by concluding free trade agreements, and by adopting legislation for the improvement of intellectual property protection and investment opportunities.

Without any state intervention, the opening of the agricultural market would facilitate overall industrialization, considering that the import of cheap foodstuffs
has a beneficial effect on wages. It would certainly also encourage a further agro-industrialization in other parts of the world. At the same time, however, it would probably wipe out most of the national farm sector in Chile and Colombia, which is not equipped to compete with the world's strongest, and often state-supported, farm systems. Some protective measures have therefore remained in both countries, albeit at a significantly lower level than before. Public policies for technology transfer, diversification, land access improvement and management can be considered as instruments of the government to speed up the industrialization of agriculture. The peasantry has to be converted into viable enterprises that can afford industrial inputs, sell on the market at competitive prices, and raise a family income at the same time.

During the interviews in Chile and Colombia we found support for both the market-led as well as the state-led strategies. Not surprisingly, the support for the state-led strategy was particularly voiced by the main Colombian producer gremios, such as the federations of rice and cereal producers and of agronomists, and the Sociedad Nacional de Agricultura (SNA) in Chile. Chilean fruit and wood exporters and the exporters of flowers, potato, sugar and vegetables in Colombia were among the main advocates of the market-led strategy, at least for the products they are involved in.

The Latin American exporters thus advocate a production strategy similar to that of the transnational crop development conglomerates, but with a different motivation. The conglomerates have a global approach. They deal with a great variety of basic food crops, which enable them to supply markets everywhere, while their diverse and multinational production base requires unhindered movement of capital and products around the globe. The slogan 'Feeding the World' reflects the increasingly global scope of thinking of the agro-industrial TNEs. The Latin American agro-exporters, however, have a different reason to advocate trade liberalism. Provided that they do not form a part of these TNEs themselves, the export producers are much more vulnerable to the volatile world market, because their production base is located in only one country and they lack a domestic market for their products. The Latin American exporters seek insertion into the world market through agricultural niches and require a liberal trade strategy because both the technology and markets on which they entirely depend on are mainly situated in OECD countries.

The governmental agricultural policies in Chile and Colombia are directed towards a further industrialization of agriculture. Also the attention to the poor rural population is based on the intention to incorporate the small farms into the agro-industrial system. However, this intention can only partly be effectuated. As indicated above, a large part of the poor rural population cannot enjoy the intended benefits of the government support programmes. As many farms are considered to be 'non-viable' production units, neither the government nor the established farm unions wish to invest in their development any longer. Their problems are considered to be a 'social' rather than a 'production' issue (interviews Jordán, 1996; Orella, 1996). Whereas in the main OECD countries the superfluous farm population
could be absorbed by expanding industry or has been supported by public social security schemes, in the two Latin American countries in question neither the industrial capacity nor social support suffice to this end. This implies that a considerable part of the rural population is left to fend for itself. The needs of this group are primarily addressed by a wide variety of non-governmental organizations, including domestic organizations of campesinos, of indigenous peoples and of afro-americans; churches; nature-oriented, farm-oriented, and internationally operating NGOs; foreign aid donors; and also cocaine barons and guerrilla forces.

The common denominator of the NGOs we have interviewed is the concern for a further marginalization of a considerable part of the rural population as a result of agro-industrialization. They disapprove of the policies that prompt farmers to implement monocropping rather than diversification, because this would endanger food security. Striving for competitiveness requires the use of commercial plant varieties and associated agro-chemicals, which raise production costs and worsen contamination problems. The organizations therefore aim at an autonomous production strategy, i.e. production independent from the international market or even from the market economy as such. Their goals include food security for resource-poor, rural communities, and a reduction of production costs through more efficient use of locally available natural resources.

The Colombian and Chilean nature and farm-oriented NGOs generally maintain intensive contact with like-minded NGOs and donor organizations in OECD countries. The conceptual or ideological similarity between these organizations is high, and enables transnational coalitions between Northern and Southern organizations in the promotion of what we have referred to as the 'non-industrial, farm-oriented production strategy'. However, the Colombian and Chilean position in the international division of labour in agriculture is different from that of the home countries of the internationally operating NGOs. This difference seems to induce South-North tensions in the interpretation of the non-industrial production strategy. Whereas Northern advocates of this strategy to a large extent have ideological or romanticist grounds, their Southern counterparts tend to have more pragmatic considerations. The misery that results from their marginal position in an industrializing agricultural sector leaves the 'non-viable' farmers no other option than to rely on locally available resources and traditional knowledge. Hence, in Chile and Colombia, conservation of biological diversity and the use of landraces is not an objective per se, but a necessary condition for sustaining the resources required for achieving a minimum of food security.

6.1.4 The PGR conflict as a 'spark' between rival agricultural production strategies

In a first step to explain the controversy on crop development in the Third Agro-Food Order we have introduced three ideal-types of agricultural production strategies that can be distinguished in the market economy. This typology of rival strate-
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gies applies to OECD and developing countries alike. However, the political choices for either of the strategies have more severe social implications in developing countries, as agriculture still constitutes a major pillar of their economy.

The neoliberal strategies pursued in Chile and Colombia have revealed a split in the agricultural sectors of both countries. As soon as the protective wall was lowered, it became clear which crops could be produced competitively, i.e. which could compete with imports or be exported, and which could not. The competitiveness of crops also indicated which producers could win from liberalization and which would lose. Producers of export crops tend to benefit from a market-led agricultural production strategy, while producers of the main staple crops require and demand governmental protection.

The basic assumption of the neoliberal policy is that an open trade regime leads to higher growth rates, which will create employment and so contribute to poverty reduction. This may happen in the long term; meanwhile many Chilean and Colombian farmers cannot participate in liberal industrialization process and are further marginalized. They have to rely on their own improvements in production, and support from NGOs and foreign donors.

In the following sections we explain how the growing gap between industrialized and non-industrialized agricultural production strategies in Chile and Colombia helps an understanding of the controversy over crop development. The tension between production strategies is not restricted to the question of which farmers are able to survive neoliberal policies. Each production strategy includes a particular view on how conservation and IPR protection should support agriculture. The controversy on conservation and IPR protection is, in our view, therefore caused by controversy on production strategies.

6.2 The state loses control over national conservation

In the middle of the Chilean desert lies a heavy bunker, the design of which closely resembles that of a ballistic missile launch installation. But instead of rockets, it contains a 'core' collection of Chile's national biological diversity. The fact that this bunker was mainly financed with Japanese funds illustrates the general development that is at issue in this section, namely that the conservation of seed, plants and plant material is no longer dominated by national agricultural interests only, but also serves the interests of the transnational crop development conglomerates.

The international involvement in national and local conservation strategies has caused considerable opposition in Chile and Colombia. The fact that most opposition is brought to bear by small farmers' groups and indigenous peoples' organizations leads to the second issue of this section, i.e. the PGR conflict as an element or 'spark' in the frictions between non-industrialized and industrialized production strategies. What role does the PGR conflict play in the survival of marginalized groups? What do these groups expect from the implementation of the CBD?
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6.2.1 The disconnection of national agriculture and conservation

One of the conclusions we were able to draw from interviews with breeders and agricultural producers in Chile and Colombia was that a uniform pattern in conservation does not exist. Different market orientations result in different strategies in breeding and consequently in conservation. Opinions about the importance of conservation of landraces and wild relatives even vary per crop. The background of this disparity is the new market-orientation in agriculture in the two countries. The necessity to produce against internationally competitive prices makes producers rely increasingly on imported, high yielding varieties bred by the transnational crop development industry. The result of this tendency seems to be a situation in which the focus of the national conservation efforts is shifting towards the interests of the transnational crop development industry.

It is common knowledge among plant breeders that no country is self-sufficient when it comes to plant genetic information. Agricultural production in all countries is based on the historical, worldwide exchange of plants and seeds that have been used in local breeding programmes. Examples are the wheat and rice production in Chile and Colombia. Apart from foreign varieties, locally bred plant varieties contain plant material from various sources, including varieties of the CGIAR, foreign commercial varieties, national varieties, and locally collected landraces (interviews Accatino, 1994; Von Baer, 1994 and 1996; Muñoz, 1994).

During the Third Agro-Food Order a qualitative change can be detected in which developing countries increasingly import finished varieties from the crop development conglomerates and independent breeding organizations in OECD countries. Since the import of foreign varieties makes domestic breeding efforts superfluous, the direct importance of locally available resources of plant genetic information for national agriculture tends to decline. This increasing incompatibility of conservation and national agriculture can be illustrated with the example of maize conservation.

In Chile, a considerable variety of maize landraces can be found. Maize was introduced in Chile by the Incas from Peru, 200 years before the Spaniards arrived. Ever since, maize has been adapted to Chile’s many different agro-ecological conditions. The resulting genetic diversity induced the CGIAR institute IBPGR (now IPGRI) to co-finance a maize collection programme, which was carried out by the Instituto Nacional de Investigación Agropecuaria (INIA) during the 1980s. While duplicates of the collected material were transported to the U.S. National Seed Storage Laboratory (NSSL) (INIA, 1990:5), the collection seems hardly relevant for maize production in Chile itself. Around 90 per cent of the maize acreage is planted to hybrid varieties imported from American and European enterprises. Only 10 per cent of the land on which maize is produced is used to grow choclero, a traditional open-pollinated maize which is used to prepare humita, a national maize pasta. One of the seed firms we interviewed, Agro-Tuniche, showed an interest in this market segment, but only as a hobby. The firm is the local maize seed dealer of the U.S. company Mycogen. Its Chilean vice-president used the INIA
maize catalogue for the collection of landraces in Chile and Peru, in order to set up a small breeding programme. From a commercial point of view, however, the variety is of marginal importance (interview Alamos, 1996).

A similar situation regarding maize can be found in Colombia. The country hosts a wealth of genetic diversity in maize. A third of the accessions of the national seedbank maintained by the Corporación Colombiana de Investigación Agropecuario (CORPOICA) consists of maize seeds. The Colombian maize collection is playing an important role in the international LAMP collection network, which is supported by the USDA and Pioneer Hi-Bred (see section 4.5.2). The project also facilitates a free transfer of Colombian maize seeds to the USA. The function of the maize collection for Colombian agriculture is tending to decline, however. CORPOICA runs a maize-breeding programme, but this primarily involves non-hybrid varieties, which are not adjusted to the demands of the processing industry. Even though most of Colombia's maize acreage is still planted to the local open-pollinated varieties, the market for American hybrid varieties is growing (interviews Barbosa, 1994; Copete, 1994; Torres, 1996; Urres, 1996).

The reliance on imported varieties is particularly strong in the case of non-traditional exports. Even though in some cases there is abundant local availability of genetic resources, there are no national breeding programmes in support of the new export orientation. The few initiatives to set up a breeding programme based on endemic plant material could not attract any interest from the private industry, as the following examples show.

In Chile, thanks to favourable agro-ecological conditions and short distances to the major harbours, export production of strawberries is a profitable business. Strawberry is native to Chile, and the world's main commercial varieties, which have been bred in the OECD countries, are partly based on species that were collected along Chile's vast coastline. Domestic producers, however, are not interested in the native resources. The local landraces are good in taste and size, but their yields are low. In the early 1990s, the Catholic University of Chile initiated a strawberry-breeding programme with foreign financial assistance, but the programme was terminated as soon as the foreign donations dried up. Chilean export producers prefer to obtain their varieties from the USA and Europe, rather than invest in their own breeding programme (interview Legarraga, 1994).

A similar attitude can be found among wood exporters. Around 40 per cent of the value of Chile's agricultural exports consist of wood products, but this prominent economic interest is not translated into tree breeding or conservation programmes. Various parts of southern Chile are still covered by primeval forest. Since around 60 indigenous wood species are threatened with extinction, various universities have started to collect shoots and other material of the trees for conservation and propagation. There is no industrial interest in the universities' genebanks, however. The industry concentrates on fast growing species, including Pinus, Eucalyptus, and Populus, which are imported from Australia, the USA and Europe. The native trees grow too slowly for commercial exploitation (interviews Benoit 1996; Lara, 1996; Seemann 1996).
We have mentioned earlier that Colombia is the world's second largest cut flower exporter. Most production is based on sub-tropical varieties produced in OECD countries, even though the country's tropical forests contain a wealth of wild flowers. The export producers have no commercial interest in these resources. This was the reason why they turned down an offer to collaborate with researchers of the University of Antioquia in Medellin, who set up a research and breeding programme on the native Heliconia flower. Of the 250 existing Heliconia species, 92 can be found in Colombia, of which about 48 are endemic. As American researchers are also working on a breeding programme for this flower, the University is now looking for Asian investors and technology suppliers, in order to breed a commercial Colombian variety (interview Arthehortúa, 1996).

Another Colombian example is in fruit production. In Colombia, there is optimism about the export potential of tropical fruit species that have not yet been marketed. The Corporación Colombia International (CCI) was specifically established by the government and businessmen to explore U.S. and European niche-markets for Colombian fruit and vegetables. Referring to New Zealand's success in exporting kiwi fruit, some Colombian businessmen even consider the pitahaya or guanábana to be the Colombian 'kiwi' of 2010 (Anonymous, 1995a:25). The CCI, however, does not intend to encourage domestic breeding or conservation programmes of locally available plant species (cf. CCI, 1994; interview Isaacs, 1996). Initial exploration of Colombia's richness in tropical fruit was only carried out by two public international research institutes, CIAT and IPGRI (interviews Dehouck, 1996; Williams, 1996).

The lack of interest in breeding on the part of export producers in Chile and Colombia seems to have two causes. The first is that the Latin American producers consider themselves to be technically behind. It takes a very long time and considerable capital investment before commercial varieties can be developed from wild plant species. Relying on foreign varieties bred in OECD countries is much cheaper (interviews Baldrich, 1994; Camacho, 1994; Alamos, 1996; Concha, 1996). This pragmatic attitude is illustrated by a statement of the Director of Viveros Requinoa, a Chilean fruit producers' association: "Excellent material can be bought from foreign breeders in California or in France. They have sometimes 40-50 years of experience. We will not be able to perform better, not even through large investments in national research programmes. Why compete when we can buy it?" (interview Concha, 1996).

In addition to the technical capacity, it is generally conceived in the two countries that the absence of investment in breeding is grounded in the tradition of political instability in Latin America. Domestic private companies are not inclined to develop long-term investment strategies. An official of Fundación Chile, an organization set up to encourage private entrepreneurship in Chile, puts it as follows: "All older people know that the policy of today may be different tomorrow. Even though there has been considerable stability in the past 15 years, still there is no trust that this period will last for a longer time." (interview Lorenz, 1996).

The choice of producers of non-traditional export commodities to import plant
International Division of Labour in Crop Development

varieties from the crop development industry in OECD countries, rather than breeding new varieties themselves, is not only strengthening the international division of labour in crop development; it also has consequences for the interest in conservation. Where domestic breeding programmes are absent, there is little national incentive for the collection and conservation of landraces and wild relatives. If these materials are being collected, it is basically because of funds made available by international or foreign organizations. The consequence is that the objectives of conservation are primarily directed towards the requirements of the foreign crop development industry, while the direct relevance for national agriculture is unclear.

This situation is illustrated by the new INIA seedbank, which is equipped for long-term conservation. Although it stores Chile’s national collection, it was the Japanese Agency for International Cooperation (JICA) that provided most funds. JICA built the Chilean seedbank and helped to fill it. In the period 1988-1994, JICA and INIA jointly organized eight expeditions to various regions in the country in order to collect forage, strawberry, and tomato species (interview Cubillos and Lobos, 1996). The large Japanese involvement is not merely an act of charity. Japan and Chile cover similar climatic zones, albeit on opposite sides of the equator. Chile’s biodiversity may thus help to secure Japan’s long-term access to genetic information in support of its national, highly industrialized agricultural production system.

We could only find a few examples of increased international competitiveness coinciding with an interest in local conservation: Colombian potato breeding is one of them. Due to climatic differences, the high yielding potato varieties from Europe or Canada cannot grow in the Andes. The absence of superior foreign varieties, and the good economic prospects for the regional export of local potato landraces (criollo varieties), generates an interest in the nationally available potato resources for national breeding programmes (interview Arevalo and Lugán, 1996).

Also in Colombia’s coffee breeding programme, there is clear link between national collection and production. The export of coffee is of major importance to Colombia’s economy. In 1993, coffee exports amounted to nearly one quarter of the value of Colombia’s total exports (World Bank, 1996). The coffee producers, organized in the Federación Nacional de Cafeteros (FEDECAFÉ) possess one of the most valuable coffee collections and breeding programmes in the world (interview Herron, 1996).

In sum, a uniform pattern in conservation does not exist in Chile and Colombia. Only one general trend can be discerned in which national conservation and crop development are becoming less compatible, due to the market-orientation in agriculture. In various important staple crops, high-yielding foreign varieties are increasingly preferred over domestically bred varieties. For non-traditional export commodities, the breeding of the country’s own varieties is not considered to be cost effective. Even for crops of which genetically diverse plant material is locally available, there is no private investment in breeding, except for a few cases in which suitable foreign varieties fail. The preference for imported varieties depresses national breeding efforts and diminishes the value of native species as a breeding base for national agriculture. This development has not terminated investments in national
The exploitation of plant genetic information, however. On the contrary, the conservation of native species secures the long-term access to genetic information of the transnational crop development industry. Whereas the increased market-orientation in agriculture tends to disconnect conservation and crop development at national level, a new connection between the national conservation efforts in individual countries and plant breeding seems to be established at transnational level.

6.2.2 The national controversy over biodiversity conservation

The ratification of the CBD in 1992 codified and confirmed the right of countries to subject diverse biological organisms within their territories to national sovereignty. The CBD sets out the general rules for the conservation and access to biodiversity, but the precise implementation of these rules is left to the signatory countries themselves. This has caused considerable political controversy in Chile and Colombia. On the one hand, the market-orientation in agriculture in both countries has made many actors cautious of an orthodox interpretation of the CBD. Hindering foreign organizations in exploring national biodiversity may backfire when national organizations require access to genetic resources abroad. On the other hand, marginalized farmers' and indigenous peoples' organizations have seized the national implementation of the CBD as an opportunity to improve their socio-economic position. They claim communal rights to locally available biodiversity in an effort to enforce their struggle for more autonomy.

In the previous section we concluded that the market orientation in agriculture in Chile and Colombia tends to result in a greater reliance on foreign high-yielding plant varieties. Producers therefore have an interest in shaping the conditions that facilitate the import of foreign varieties. One measure is to adopt IPR protection legislation, the other is to keep access to the national flora relatively open. The word 'relatively' must be emphasized in this respect, because also several researchers and export producers in Chile and Colombia had mixed feelings about foreign organizations collecting native plant species in their country for the development of protected, commercial varieties (interview Patiño, 1994; Arevalo and Luján, 1996; Arhehortúa, 1996; Madrid, 1996). They mentioned several examples of native species that are exploited by the foreign crop development industry, including strawberry and tree tomato (fruit), quinoa (grain), Alstroemeria and Heliconia (flowers), and potato. The uneasiness, however, seemed largely to be a self-criticism, in that domestic organizations were either not interested or not able to invest in the commercial exploitation of local biodiversity themselves.

A prevalent perception among researchers and producers was that ready access to foreign plant material was much more important than preventing the exploitation of native species by foreign organizations. The head of INIA's genetic resources programme in Chile argues that "as most other countries, we rely almost exclusively on foreign germplasm, so we should cherish possibilities for exchange. We therefore cannot permit ourselves to maintain a restrictive access policy"
For similar reasons the Colombian national PGR coordinator at CORPOICA supports open access: “Like the USA we depend on the inflow of foreign material to keep our agricultural sector going. The CBD could sincerely diminish the exchange of economically important material.” (Interview Lobo, 1996). The concern that any hindrance of access to the national biodiversity would backfire on Chile’s access to foreign propagating material of the *Eucalyptus* and *Pinus* species was even the reason for an attempt by several members of the Chilean Congress to exclude tree species from the implementation of the CBD (Interview Muñoz and Flores, 1996).

CGIAR centres, CIAT, and IPGRI Americas in Colombia were very concerned about the negative impact of the Colombian CBD regulation. Breeders and curators of both institutes felt that the CBD might harm the free access policies on which the CGIAR network has built its collections in the past three decades. CIAT’s conservation strategy will be most directly affected by the Andean Pact Decision 391 of the Common Arrangement on the Access to Genetic Resources, which arranged the implementation of the CBD (Comisión del Acuerdo de Cartagena, 1996). Decision 391 specifies sovereign and indigenous rights over PGR, and allows signatory countries to replenish established access policies - such as CIAT’s free access policy (Interview Roca, 1996). Since 1992, CIAT seedbank curators have increasingly been confronted with conditional requirements for access (such as reciprocity) or total refusals of requests for landraces and planting material. IPGRI Americas’ director even fears a “black market” among breeders that want to circumvent the increasingly complex national access regulations (Interview Williams, 1996).

Whereas Chilean and Colombian breeders and producers have little interest in a strict access regulation, the many small farmers’ and indigenous peoples’ organizations tend to have an entirely different view on this issue. Protest against the free access regime and the unequal benefits derived from PGR has even become one the spearheads of their campaigns to improve their living conditions.

The PGR conflict first emerged during the drafting process of the FAO Undertaking on Plant Genetic Resources in 1983 (see section 1.1). Although the FAO debates lasted throughout the 1980s, they were confined to governmental representatives and northern farm-oriented NGOs. During the debates, PGR was merely treated in terms of their economic value for the northern agro-industry. The implementation of the CBD anchored the PGR conflict in the much broader discussion on the sustained use of biodiversity. In these discussions, small farmers’ groups and indigenous peoples’ organizations were not only recognized as victims of the gene-drain, but also as the ‘custodians’ of the earth’s biodiversity. This recognition has a considerable emancipating effect on communities that still rely on non-industrialized forms of production. Most is expected from CBD Art. 1, which stipulates a “fair and equitable sharing of benefits arising out of the utilization of genetic resources”; Art. 8(j), which recognizes the importance of “indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity”; and Art. 15(d), which demands
"prior informed consent" of the owners or custodians of PGR (UNEP, 1992).

The intensity of the PGR conflict in Chile and Colombia suggests that it cannot be considered as an isolated political issue. Questions on access to PGR provoke most controversy when they interfere with broader, long-standing political controversies, particularly territorial and ethnic rights. The PGR conflict is often further intensified when local pressure groups are able to strike transnational coalitions with other organizations. The introduction of cheap and fast communication lines, particularly the fax and more recently the Internet, have given Chilean and Colombian pressure groups access to a growing amount of information, finance, and political and moral support from like-minded organizations worldwide. Both the intensity and global extent of the attention local PGR issues can attract in a short notice have made it increasingly difficult for the Chilean and Colombian governments to neglect the political demands of marginalized groups.

In Colombia, matters of access and exploitation of native PGR result in conflicts between the government and indigenous peoples' organizations only when they are directly connected with broader issues of territorial and ethnic rights. The Colombian constitution recognizes territorial rights of indigenous groups, as well as the economic and cultural value of biodiversity within their territories. This has allowed them to build up considerable political pressure on the national government on biodiversity access questions. The implementation process of the CBD in Colombia has even led to a relatively successful coalition between indigenous peoples' organizations and nature-oriented NGOs. With the support of several congress members, the coalition succeeded in establishing an Ad Hoc Working Group on Biodiversity at the Ministry of Agriculture. Protected by its official status, the Working Group drafted Colombia's national biodiversity conservation strategy. In 1994, the Group was able to gain regional and international support for its actions during the drafting process of Decision 391 of the Andes Pact (interview Pombo, 1996). However, the Group encountered serious governmental opposition, especially after it had attempted to prevent the entrance of oil-drilling and wood logging companies into indigenous territories on the grounds of territorial and cultural rights of the indigenous peoples. The Colombian government succeeded in outmanoeuvring the Group from the national political arena in September 1994, when the new Ministry of Environment was founded, which took over the implementation of the National Biodiversity Strategy from the Ministry of Agriculture. From then on, the status of the Group diminished to that of an advisory panel (interviews Flórez, 1996; Fonseca, 1996; Pombo, 1996).

Mapuche indigenous communities in southern Chile have also attempted to link PGR conflicts to the long-term, structural problems - problems notably of territorial and ethnic rights - that they have faced since colonization by the Spanish. Although these problems gained limited international attention, the exploitation of PGR of potato landraces of the Mapuche by foreign breeders was rapidly picked up by many international nature and farm-oriented NGOs (interview Herrera, 1996). The international criticism came to a climax in 1995, when it was discovered that Mapuche blood and hair samples were taken for analysis in the US Human
Genome Diversity Project (HGDP) without what in CBD wording is called "prior informed consent". In several poignant RAFI press-releases the HGDP was dubbed a "vampire project" (RAFI, 1995b). Although Mapuche representatives welcome the large international attention for the potato and blood cases, they are concerned that the PGR access question will not improve the fate of the Mapuche in Chile, if it is not placed within a broader territorial, ethnic, and socio-economic context (interviews Heunchulaf, 1996; Nain and Santander, 1996; Melillan and Antilef, 1996). This concern was clearly summarized by the director of the Chilean National Corporation for Indigenous Development (CONADI): "Of course we don’t want to be considered as a bag of genes. But there are many more urgent problems which hit us almost every day: poverty, inequality, lack of legal status, discrimination, racism ..." (interview Heunchulaf, 1996).

The critique of the Mapuche in Chile and the difficulties of the Ad Hoc Working Group on Biodiversity in Colombia indicate that the real political significance of the PGR conflict lies in its relation to the socio-economic position of marginalized groups. Although the interests of small farmers and indigenous communities are often addressed in international biodiversity conferences by transnational NGOs, the FAO, UNEP, World Bank, or the Conference of Parties of the CBD, the communities themselves are often unable to translate the outcome into political measures that improve their socio-economic position. This experience has raised considerable scepticism among the organizations of farming and indigenous communities about the real purpose of the CBD. The difficulties they face when they attempt to connect PGR issues to ‘hard’ political issues has led to the belief that the CBD is more in the interest of OECD countries.

The inability of marginalized groups really to benefit from the juridical framework offered by the CBD is the bottom line of argument of the Latin American Institute for Alternative Legal Services (ILSA, Colombia). Flórez of ILSA comments that although the CBD recognizes the role of indigenous groups in the conservation of biodiversity, they are not in a position to enforce a mechanism of "fair and equitable sharing of benefits" (Art. 1) that really serves their interest. An additional constraint is that the heterogeneity among the communities is likely to result in fragmented policies on benefit sharing (interview Flórez, 1996). The Centre for Technology and Education (CET, Chile) holds that international NGOs have created a climate in Chile in which indigenous peoples’ organizations have been forced to negotiate complex access regulations. Many small groups lack the institutional and financial capacity to negotiate their interests adequately (interview Montecinos, 1996).

The limited capacity to fight political battles over PGR has made farmers’ groups and indigenous peoples’ organizations dependent on their alliances with OECD-based NGOs which do possess sufficient financial and human resources. The fact that especially nature-oriented NGOs, which tend to consider indigenous groups to be custodians of biodiversity, have often taken the initiative in helping developing countries to implement the CBD, has also caused distrust. A. Green, the main representative of the National Organization of Indigenous Communities (ONIC, Colombia) warns that too explicit attention for biodiversity as ‘scarce
nature' may also backfire on their interests as active users. He cites the establishment of the Katio nature park in the Chocó region, which implied the expulsion of indigenous Embena and Wandana communities (interview Green, 1996). A similar concern is expressed by the Colombian Ad Hoc Working Group. In 1994 the Group had to put much effort into diminishing IUCN's influence in the drafting process of ‘Decision 391' of the Cartagena Agreement. The Group disagreed with IUCN’s strict economic interpretation of the CBD access regulation. During a preparatory meeting early in 1994, IUCN had proposed a compensatory mechanism resembling the ‘bioprospecting’ system applied by pharmaceutical conglomerates (see section 5.2.2). This interpretation, in combination with IUCN’s limited consideration of ethical, social and agricultural issues brought up by the indigenous peoples’ organizations, created an atmosphere in which the Group felt overruled by a northern-based NGO (interview Pombo, 1996).

In sum, for small farmers and indigenous peoples the conservation and use of biodiversity is just one element of an age-old, non-industrialized agricultural production strategy. Battles over the genetic resources this biodiversity contains can therefore also be considered as one element of a much larger struggle for the survival of the non-industrialized production strategy. The recent attention for biodiversity allows marginalized groups to link PGR conflicts with issues that may ease their social and economic position, such as territorial or ethnic rights. Simultaneously, the PGR conflict offers opportunities to attract international support for their position. In Chile and Colombia this support often does not meet the most urgent demands of the small farmers’ groups and indigenous peoples’ organizations. The rationale of northern environmental NGOs for helping these groups is mainly based on a mixture of concern for pressures on both farming communities and biological diversity, while it is not always clear which of the two is considered to be the means for sustaining the other.

6.2.3 National conservation for the transnational crop development industry

While controversies on conservation are gradually entering the national political realm, it seems as if the Ministries of Agriculture in Chile and Colombia are not the prime actors any more in the design of conservation strategies in both countries. Instead, the national conservation strategies are increasingly embedded in an international division of labour in crop development in which international, rather than national agricultural interests prevail. We have discussed three tendencies that contributed to this development: (a) the market orientation in agriculture, (b) the growing importance of foreign donors in national conservation; and (c) the growing impact of the CBD on national conservation strategies. The question that now arises is what is the driving force behind this development?

One part of the answer lies in the growing interest of OECD countries in sustaining global conservation. To continue to be able to develop new varieties, OECD-based conglomerates require a permanent access to an increasingly broad
'genepool', the greater part of which is still available in developing countries. Chile, and especially Colombia, possess a considerable share of that genepool and have therefore become the beneficiaries of GEF programmes, bilateral aid programmes, and corporate funds to maintain and extend national collections. The other part of the answer lies in the growing dependence on high-yielding, foreign plant varieties. In view of the opening of the agricultural markets in Chile and Colombia, the usage of such varieties is required if national production is to be internationally competitive. The direct interest in the national conservation projects with foreign finance thus lies with the crop development conglomerates and independent breeding organizations in OECD countries. Domestic producers may benefit indirectly when they import the foreign, protected plant varieties.

The interest of the transnational crop development conglomerates in maintaining the global genepool, and the access to it, sheds new light on the interest of OECD countries in the implementation of the CBD. The CBD enables signatory countries to restrict the access to PGR. It seems unlikely, however, that either the Chilean or the Colombian government will use the CBD in this way. The ready access to foreign plant varieties and germplasm, which is required for the market-led agricultural production strategy, may come in danger when the door to the national biodiversity is closed. Another explanation lies in the decrease in public funding for national conservation, inducing seedbanks to accept finance and conditions from foreign and international organizations. As a result, the CBD seems to facilitate both conservation of and access to diverse biological organisms. Most developing countries demand some form of 'primary informed consent', or a symbolic compensation for the export of landraces and wild relatives, e.g. payment for shipment costs. The CBD, however, has facilitated the formulation of such regulation on the basis of internationally agreed rules and principles. They may involve some transaction costs, but the overall benefit seems to be for the transnational crop development conglomerates. The CBD creates worldwide clarity on what genetic information is available, where it can be found, and under what conditions it is accessible. From this point of view, the CBD contributes to the advancement of the market-led, export-oriented production strategy that prevails during the Third Agro-Food Order.

Although the implementation of the CBD still depends on decisions of national governments, the conditions for such decisions are increasingly set by transnational actors. Particularly internationally operating nature-oriented NGOs, notably the IUCN, WRI, and WWF have become very active in designing 'global' conservation strategies that are actively promoted in developing countries that implement the CBD. Although these organizations do recognize the rights and problems of the marginalized groups, they intend that both non-industrialized and industrialized agriculture should benefit from biodiversity conservation. This non-discriminative stance denies the rivalry between the two strategies. Non-industrialized farming and indigenous communities receive recognition and sometimes funding for their role as custodians of biodiversity, but this support is hardly ever framed in broader programmes geared to general socio-economic improvement. OECD countries, on
the other hand, do benefit from the genetic information that the CBD related global conservation programmes generate. This fact makes the current global conservation strategies less politically 'neutral' than they are often presented to be.

The gradual integration of Chilean and Colombian collections and uncollected native species into the global 'gene-pool' has revived protests from those groups depending on a non-industrial, farm-oriented production strategy. They consider the free global exchange of locally used plant material to be another, unwanted aspect of an increasingly industrialized, technology driven agricultural production strategy. The recognition in the CBD of the rights of farmers and indigenous groups as custodians of biodiversity has allowed these groups to generate considerable attention for their marginalized position. The real political gain of the CBD will, however, depend on their ability to link the PGR conflict to other, long-standing ethical and territorial questions. In Chile and Colombia, this seems rather difficult because the main thrust of governmental policies during the implementation of the CBD is to prevent the PGR conflict from 'spilling over' into other political issues.

Summary

This section has illustrated how the market orientation of Chilean and Colombian agricultural producers has enlarged their dependence on foreign plant varieties. This development has a somewhat contradictory impact on the use of national collections. On the one hand, the import of finished varieties is likely to diminish the national breeding capacity and the active use of national collections by breeders. At the same time, however, both Chilean and Colombian collections are becoming part of internationally financed conservation programmes which seem to serve the long-term interests of the transnational crop development conglomerates.

This tendency, in which private, transnational interests increasingly govern national conservation criteria in Chile and Colombia, is opposed by domestic farm and nature-oriented NGOs and indigenous peoples' organizations. In an effort to improve the socio-economic position of marginalized farm communities, they try to use the national implementation of the CBD to reinforce their long-standing territorial, socio-economic, and ethnic rights.

6.3 Controversy over the intellectual property protection of biological organisms

Intellectual property protection of plants has probably been the most disputed issue of crop development in the past decades. IPR protection is expected to encourage private organizations to invest in plant breeding research so that new varieties are developed to the benefit of the agricultural sector. However, many organizations in OECD and developing countries strongly oppose such protection for economic, ethical, or cultural reasons. In this section we show that the reason for being in
favour of or against IPR protection of plant-related innovations corresponds with the preference for one of the three agricultural production strategies that we have distinguished above.

Three different agricultural producer interests that can be distinguished: (a) the agricultural exporters, (b) the breeders of national food crops, and (c) the peasantry. We indicate that the opposition to IPR protection in Chile and Colombia comes entirely from organizations that represent or support resource-poor farming communities and indigenous peoples, as well as from nature conservation NGOs.

6.3.1 IPR and plant breeding for export crops

In the previous chapter it was explained how in the 1990s the principles of legal plant protection were exported from OECD countries to the rest of the World. They were accepted by most countries as part of the process of economic liberalization they were undergoing, and were formalized as a new international standard through the adoption of the TRIPS agreement in 1994. Both Chile and Colombia had anticipated this new IPR agreement. They enacted PVP legislation in the mid-1990s, acceded to UPOV in 1996, and also allow the granting of patents on plant genetic material. The protection of intellectual property rights of the foreign plant breeding industry fitted well in the neo-liberal economic policy followed in Chile and Colombia. Therefore, the advocates of IPR protection of plants in these two countries are primarily those organizations that benefit from the economic liberalization: the producers of export commodities.

As we have pointed out in previous sections, plant breeding in fruit, vegetables, cut flowers and trees is almost non-existent in both Chile and Colombia. The producers of these non-traditional export commodities are nevertheless in favour of IPR, not because it stimulates them to invest in plant breeding, but because it facilitates the import of foreign plant varieties. Indeed, around 45 per cent of all PVP titles in Chile were granted on foreign fruit and flower varieties until 1996 (interview Messina, 1998) while (as already mentioned), the first wave of PVP applications in Colombia in 1997 mainly involved foreign cut flower varieties (UPOV, 1998:9). In the period before the PVP system was in place, the Colombian and Chilean producers also had access to foreign varieties, but this was based on gentlemen’s agreements and contract law. Foreign flower breeders even used to organize annual fairs in Colombia to show their varieties to export producers. However, the absence of plant-related IPR protection had a price. It is generally considered by the export producers that the foreign breeders offered neither their latest varieties nor the best germplasm quality, and that the royalties were higher and the licensing conditions less favourable (interviews Camacho, 1994; Patiño, 1994; Arango, 1996; Concha, 1996).

In Colombia, the few producer organizations that have their own breeding programmes, such as FEDECAFÉ (coffee), CENICAÑA (sugar cane), and FEDEAR-ROZ (rice), may enjoy a genuine benefit from IPR. Like the transnational crop-
development conglomerates, the world's main advocates of plant-related IPR, the Colombian breeding organizations have a technological edge to defend, though at a regional rather than a worldwide level. They have a particular interest in protecting their germplasm from exploitation in competing countries in the Andes Pact, and in Central American countries. Particularly in Ecuador, Venezuela and Guatemala, Colombian varieties are often propagated and used by farmers (interviews Cock, 1994; Herron 1996; Sanabria and Dabalos, 1996). Protection of this competitive advantage of Colombian agriculture vis-à-vis neighbouring countries was a reason that the Colombian Ministry of Agriculture promoted the adoption of a PVP system within the framework of the Andes Pact (interview Rueda, 1996).

6.3.2 IPR and plant breeding for national market commodities

The second group of advocates of plant-related IPR consists of breeding organizations that have plant breeding programmes dedicated to national market crops. The adoption of PVP legislation was especially welcomed by the small group of in total 10 to 15 domestic plant breeding organizations in Chile and Colombia: private firms, producer organizations, and public institutes. The agricultural crisis in both countries in the first part of the 1990s had a considerable impact on these organizations. The crisis reduced the area of land under cultivation, and induced farmers to use on-farm saved and informally traded seed, rather than commercial seed. The resulting contraction of the seed market had a negative effect on the profit margins of private plant breeders. PVP was therefore welcomed as a means to protect or expand their share of the seed market.

The public agricultural research institutes in the two countries had a similar reason to promote PVP. INIA in Chile and ICA/CORPOICA in Colombia have both been subject to considerable budget reductions following the embracing of neo-liberal economic policies in their respective countries. Protection of their new varieties offers the institutes the opportunity to tap additional income by collecting royalties. Seed sales are important for the institutes. About a third of INIA’s income was accounted for by seed sales in the mid-1990s (interviews Portilla, 1994; 1996).

The domestic plant breeding organizations have advocated PVP rather than patents for genetic information, because they generate new plant varieties, not patentable inventions. Moreover, due to a lack of financial and technological capacity, they breed open-pollinated rather than hybrid varieties. This means that domestic breeding organizations cannot rely on built-in protection against unauthorized propagation and therefore have an interest in legal plant variety protection.

The degree to which unauthorized propagation occurs differs considerably among crops, due to climatic, biological and technical factors. In Chile, it is considered to be a problem predominantly by the wheat breeders. While there is considerable authorized on-farm seed saving of wheat, around 40 per cent of the wheat seed supply reportedly consists of seed produced without authorization (interview Portilla, 1996). The main target of PVP for domestic Colombian breeders is the
unauthorized propagation of especially soyabean, rice, and non-hybrid maize varieties. It has been estimated that around 20 per cent of the seed demand of these crops is produced and sold without the authorization of the breeder (interview Villota, 1996).

In order to exercise their rights collectively, the Chilean plant breeding organizations, in 1995, set up a Committee of Breeders of New Plant Varieties, as a part of the Asociación Nacional de Productores de Semillas (ANPROS). The Committee’s president is provided by the sole private wheat breeding firm in Chile, while INIA and the fruit export producers’ association provide the vice presidents. The committee is working vigorously on the detection of unauthorized propagation of plant varieties and the enforcement of PVP. Because neither the farmers, seed producers, nor the judiciary is familiar with the PVP system, the committee has hired journalists to publish on PVP occasionally, and it has also designed and financed a specific training programme for lawyers. At the end of 1996, five cases of PVP violation came to court: four in relation to fruit, one to wheat (interview Salvo, 1996).

The transnational crop development conglomerates are also active in the seed markets of Chile and Colombia. They supply all seed of hybrid varieties of maize, sorghum, sunflower, as well as seed of several other crops. The main American and European hybrid maize seed enterprises also have production sites located in Chile, where seed for export is produced during the wintertime of the Northern hemisphere. Their advantage from PVP is marginal as the hybrids have a built-in protection against unauthorized propagation, and as production takes place under strict corporate control. Rather than PVP, the conglomerates may in due course use the opportunities under the patent laws of Chile and Colombia to protect genetic information incorporated in their hybrids against unauthorized exploitation.

6.3.3 Opposition to plant-related IPR

Because PVP reduces the opportunities to trade on-farm saved seed informally, and patent coverage for plant varieties even makes all on-farm propagation illegal, farmers are the most obvious potential opponents of plant-related IPR. Nevertheless, IPR protection has not yet been an issue for the major farm organizations in Chile (interviews Orella, 1996; Molina, 1996) nor in Colombia (interviews Arevalo and Luján, 1996; Gómez, 1996; Sanabria and Dabalos, 1996; Quintana and Pardín, 1996). Farm organizations have not been involved in the introduction of PVP or the patent law changes, nor have they been represented at the international forums where plant-related IPR has been at issue, such as the CBD. One of the reasons is that several of the organizations, such as FEDEARROZ and FEDECAFÉ in Colombia, and SNA in Chile, also have plant breeding programmes. In respect of PVP, they therefore have mixed interests.

Another reason for the lack of interest in IPR by farm organizations is that the effects of plant-related IPR protection on farmers vary greatly. Two groups of farm
systems will probably hardly notice a negative impact: the capital-intensive farms
and the peasantry. The capital-intensive farms predominantly use certified seed,
purchased from breeders or their official dealers. They are used to paying official
prices for the most technologically advanced varieties, and have the means to
employ them in a profitable way. The Chilean and Colombian peasants, or campesinos, presumably also remain relatively immune from IPR protection of
plant varieties, as they hardly use any modern commercial varieties. Even if they
did propagate varieties protected under patent law, it would be almost impossible
to detect this propagation, and presumably not worth the cost.

Most affected by plant-related IPR protection are the middle-sized farms, partic­
ularly those that are struggling for survival as commercial undertakings in the process
of agricultural industrialization. In order to reduce production costs, these farms may
produce seed on-farm and obtain a part of their seed requirements from informal
channels. Informally traded seed is cheaper because payment of royalties and, more
importantly, taxes can be evaded. It is precisely these informal seed distribution chan­
nels, however, that are the target of PVP. The formalization of these channels reduces
the opportunities to obtain high quality seed at an advantageous price.

Nevertheless, the major farm organizations have not opposed legal protection of
plants. The reason must presumably be sought in the fact that the concept of IPR cov­
erage for plant material is entirely new to the farm circles in the Latin American coun­
tries. PVP has only recently been enforced so that farmers have not yet encountered
its effects. The same is true for plant patenting. In the mid-1990s, the opportunity to
patent plant material was new even to most of the plant breeders we interviewed.

The organizations that did oppose PVP and plant patenting in Chile and Colombia
include nature and farm-oriented NGOs, and organizations of indigenous peoples.
They are also the organizations that favour an alternative agricultural production
strategy, which is non-industrial and farmer-oriented (cf. Anonymous, 1995b; Anon­
ymous, 1996b; Castaño, 1996; Del Pilar Valencia, 1996; Flórez, 1996; Manzur, 1995a; 1995b; Montecinos, 1996; Pombo, 1996). The organizations reject
the principle of assigning IPR to biological organisms. They maintain that the con­
cept of IPR protection is alien to the local farm and indigenous communities, and
contrary to their cultural and religious values. The organizations state that the intro­
duction of IPR protection disrupts the traditional uses of genetic resources of
plants. By assigning private rights over plant varieties, the farmers’ and indigenous
communities in their perception “lose control” over the use of their plant genetic
resources. They do not benefit from the exploitation of their landraces and wild rel­
avatives, while IPR protection also restricts or eliminates the opportunity for farmers
to save and exchange their seeds. There is also concern that even the use of tradi­tional varieties will be prohibited if they carry genes that are covered by a patent.

The organizations also reject the international division of labour in crop develop­
ment. The introduction of the Northern IPR legislation in Chile and Colombia fa­
cilitates the presence of the transnational crop development conglomerates in the
national seed markets. The conglomerates bring along their uniform and homoge-
nous plant varieties, which replace traditional varieties. The resulting loss of traditional diversity, both at the varietal and genetic level, is considered to be dangerous for national food security. The reliance on foreign, uniform varieties makes agricultural production more susceptible to pests and diseases, and increases the use of imported agro-chemicals. Moreover, IPR protection adds a 'capital drain' to the 'gene drain' as domestic breeding firms and producer organizations must pay royalties to use the foreign varieties. Licence conditions for such technology transfer may further limit the possibilities for using the germplasm.

Most organizations opt for an alternative IPR system that protects collective intellectual property rights of peasant and indigenous communities over their resources, their traditional knowledge and innovations. These communal rights are the basis for negotiating a share of the benefits derived from exploitation of community resources by third parties. Several organizations point out that, at least as far as indigenous communities are concerned, the compensation should be paid through, for example, the establishment of a better health care system. The payment of money may cause more harm than good. It may provoke conflicts among communities and disrupt the traditional way of life (interviews Aguilar, 1994; Martínez, 1996; Green, 1996).

Other organizations promote a more radical strategy. In their publications, Montecinos (1996) and Castaño (1996) maintain that “the alternative of IPR is no IPR.” They argue that entering into the so-called bio-prospecting contracts implies an acceptance of the patenting of native genetic resources, with the negative consequences for the socio-economic and cultural life of rural population as outlined above.

None of the IPR-opposing organizations in Chile and Colombia treat IPR protection as an isolated issue. They consider PVP and patent coverage of plant varieties to be elements of a particular agricultural production strategy embedded in an agro-industrial division of labour that they reject and do not want to be part of. This conviction is most clearly expressed by Montecinos (1996:25) who favours a total disruption of economic internationalization: “The only way to fight those [Northern industrial - RP/JvW] monopolies is by fighting mega-markets. This will happen when we reclaim diversified production systems based on local resources and knowledge, when agriculture ceases to be an input-consuming machine, when farmers reclaim the right to use and develop their own technology, when we stop eating the same thing in Manilla, Pittsburg and Concepción, and our health no longer depends on Monsanto and Ciba Geigy. This will also be the only way in which indigenous peoples and farmers will become the primary beneficiaries of what their societies have created and continue to create”.

Not all nature and farm-oriented NGOs and indigenous peoples’ organizations in Chile and Colombia would agree with this total rejection of the international agro-industrial division of labour. However, they do favour an alternative agricultural production strategy directed at the autonomous improvement of subsistence conditions in the poorest rural areas. And rather than Western cultural elements, the local, traditional culture and religion is to play an important role in this.
This is indeed also the strategy being followed by peasants' and indigenous communities. These two types of communities, which partly overlap, may have their own reasons for doing so, however. The peasants are less guided by ancient knowledge and religious rituals in their methods of agricultural production than indigenous people. They produce with little industrial inputs, use landraces or old varieties and on-farm saved seed, not because they intentionally strive for a non-industrial production strategy or because of a desire to conserve biological diversity, but because they simply do not have the means to purchase industrial inputs.

This is presumably the reason that the two peasants' organizations we interviewed, *La Voz del Campo* in Chile and the *Asociación Nacional de Usarios Campesinos* (ANUC) in Colombia, were hardly interested in the IPR dispute in their respective countries. For both organizations the term 'Farmers' Rights' had a connotation which had little to do with the compensatory mechanism that has been agreed upon in the FAO. Farmers' rights were rather interpreted as the "inalienable right" of farmers to have access to land, credit and support, to relieve hunger and to live in peace (interviews Gómez, 1996; Molina, 1996). There may be rural resentment against those companies that benefit from using landraces, but obviously the peasantry in the two Latin American countries has problems that are more pressing than compensation for this 'bio-piracy'.

The awareness of IPR was far greater among the indigenous communities of Chile and Colombia, partly because the widely publicized cases of the patenting in the USA of DNA of a number of indigenous people from Latin American and Asian countries, and the Human Genome Diversity Project. Tapping a person's blood, and assigning private rights for the exploitation of knowledge is entirely at odds with the culture of the indigenous peoples. The communities often attach spiritual value to blood, plants and other biological material. Moreover, the knowledge they have accumulated within their communities is closely linked to traditions. In Colombia, the communities in Antioquia may collaborate with external researchers, but only on their terms. Patenting inventions based on material collected in their territory is not allowed (interview Martínez, 1996). However, the intentions of indigenous communities should not be romanticized. They will also use modern plant varieties if these are affordable and have proven to be better than the traditional ones (interview Contreras, 1996). The IPR and access issues provoked fierce reactions among the indigenous communities in Latin America, because they come on top of a lot of other problems of a more structural character, such as territorial disputes and ongoing discrimination against indigenous peoples in Western society (interview Herrera, 1996).
6.3.4 Rival agricultural production strategies provoke IPR controversy

In the previous section we have shown that PVP in Chile and Colombia has both been embraced and rejected. Domestic breeding and producers' organizations, which are in favour of a further industrialization of agriculture welcome the introduction of PVP, albeit for divergent reasons. Producers of non-traditional export commodities require PVP to facilitate access to the foreign varieties primarily of cut flowers and fruit. Legal protection will not incite them to invest in breeding. They consider the technology gap in relation to the foreign breeders to be too wide and have no long-term confidence in the stability of the political situation in their country. Colombian producers of traditional export commodities, such as coffee and sugar cane, also favour PVP. They have their own breeding programmes, and PVP may help them to defend Colombia's technological edge compared to competing producers in the Central and Latin American region. Domestic private breeding firms or producer organizations with their own breeding programmes on crops directed at the national market, such as wheat in Chile and potato and rice in Colombia, also strongly support PVP. Legal protection against unauthorized propagation of their varieties enables them to defend their share of the seed market, which is shrinking due to economic liberalization, periods of drought and rural violence. Finally, the national agricultural research institutes wish to use PVP to compensate for the shrinking budgets. Royalties are considered to be a new, additional source of income.

The introduction of PVP advances the industrialization of crop development. PVP is adopted to encourage private capital investment in plant breeding in order to generate more productive and adapted varieties. PVP, however, is only one ingredient in the cocktail of industrial crop development. Seed laws and additional farm policies are designed to make farmers shift from their landraces and informally produced seed, to the modern and commercial varieties. In most developing countries the use of certified seed is either recommended by extension services, required as a condition for the use of credit facilities, or obliged by the processing industry.

The industrialization of crop development is also promoted by the transnational crop development conglomerates, which have been the dynamic force behind the worldwide strengthening of plant-related IPR. The transnational conglomerates and the breeding organizations in Chile and Colombia therefore have a mutual interest in IPR, albeit with a crucial difference. The conglomerates benefit primarily from patent protection, not from PVP. They hardly need PVP, because they can prevent unauthorized propagation by selling hybrid varieties, and recently also by applying so-called 'terminator' technology. The conglomerates would rather benefit from opportunities to patent their plant genetic information in Chile and Colombia. They are among the very few organizations in the world that have the financial and technological capacity to generate plant-related inventions. Thus, while producers of non-traditional export commodities and some staple crops in Chile and Colombia already rely on varieties bred by the OECD-based crop development industry, the conglomerates are likely to strengthen their position in Chile and
Colombia in relation to domestic breeders, either by selling hybrid varieties in more crops, by applying 'terminator' technology, or by seeking patent coverage for plant varieties.

Opposition to both PVP and patent protection of plants comes particularly from the nature and farm-oriented NGOs and indigenous peoples' organizations. These organizations act as a last resort for all those farming and indigenous communities that cannot participate in the process of agro-industrialization. They disapprove of plant-related IPR because it is meant to encourage private investment in crop development, and thus furthers the agro-industrialization process, which is considered to be the main contributor to the marginalization of the peasantry. In a similar vein, the organizations object to the collection of diverse biological organisms from the local communities' territory. These organisms are eventually exploited by enterprises that belong to the core of the agro-industrial system, which has little to contribute to non-industrial farming. The benefits derived from the locally collected natural resources therefore cannot be enjoyed by the peasants. The lack of land, capital, infrastructure and markets prevent them from truly benefiting from the world's advanced plant varieties. Just receiving a share of the possible financial revenues can by no means compensate for the farm communities' continuing isolation from the agro-industrial system.

In their rejection of the strategies directed at industrialization of agriculture in general and the IPR system in particular, the Southern NGOs are supported by nature and farm-oriented NGOs in the North. The Northern NGOs oppose plant-related IPR for ethical and environmental concerns, or because the seed-saving opportunities for Northern farmers may be restricted by IPR. Both Southern and Northern NGOs form a transnational alliance against the granting of intellectual property protection of biological material, in the same way that they form an alliance over biodiversity issues. Nevertheless, a basic difference remains between these NGOs. Since virtually all farms in the advanced industrialized countries are incorporated in the agro-industrial system, there is almost no social base for advancing the non-industrialized, farmer-oriented strategy in these countries themselves.

Summary

Basically two positions on the introduction of plant-related IPR can be distinguished in Chile and Colombia. Plant breeding organizations and producers of non-traditional export commodities advocate IPR. The breeders hope to reduce the unauthorized propagation of their varieties in Colombia and Chile, as well as in neighbouring countries; the producers focus on an improvement of the conditions for importing foreign plant varieties. Meanwhile, opposition to IPR protection is voiced by nature and farm-oriented NGOs and indigenous peoples' organizations. In this section it has been argued that this opposition is in fact not merely related to the direct impact of IPR protection on the peasantry, but to the entire process of agro-industrialization. Plant-related IPR protection is one element of a production
strategy that is directed towards the industrialization of agriculture, a development that has little to offer resource-poor farm communities, which cannot participate.

Conclusions

This chapter sought to examine the roots of the international PGR conflict, not from a North-South perspective, but from the perspective of conflicting agricultural production strategies. Rather than depicting the conflict simply as an unequal exchange between the ‘gene-rich and technology-poor South’ and the ‘gene-poor and technology-rich North’, we have argued that the conflict is far more transnational in origin.

We have distinguished three alternative agricultural production strategies advocated in OECD as well as in developing countries. In most countries, rival opinions on the most preferable organization of agricultural production and progress also find expression in conflicts on the exploitation and conservation of plant genetic information. Hence, the ‘PGR conflict’ is not a new, isolated phenomenon in international relations, but a ‘spark’ resulting from the frictions between rival agricultural production strategies. As these strategies have a transnational dimension, the conflicts between them also tend to cut across countries and regions. This explains why the PGR conflict is ‘transnational’ in scope, while the ‘front lines’ overlap those that divide industrialized and non-industrialized farm systems.

The opposition to the gene-drain and the patenting of plants and other biological material comes particularly from nature and farm-oriented NGOs and indigenous peoples’ organizations. These organizations act as a last resort for all those farming and indigenous communities that cannot participate in the process of agro-industrialization. The communities seem to have little to gain from the emerging international division of labour in crop development. They lack the land, the appropriate soil, the capital, the markets, and the infrastructure. Despite national rural development programmes, these resource-poor farms cannot be converted into ‘viable’ commercial family farms. Under neo-liberal policies, the support of ‘non-viable’ farms is considered to be an inefficient allocation of government means. In this way, the poorest category of farm communities is increasingly dependent on national and foreign aid programmes. They are further marginalized from the market economy and left to their own, non-industrial production and survival strategy.

Traditionally, the interest in this non-industrial agricultural production strategy on the part of private and public research organizations has been low. The organizations that collect landraces and wild relatives, and protect their varieties with IPRs, form part of the transnational, agro-industrial system, which has little to contribute to the non-industrial production strategy. The plants are collected with the objective of improving market-oriented agro-food production and will hardly contribute to non-industrial agriculture. Benefits derived from the collected natural resources cannot be enjoyed by the peasantry, because they lack the means to industrialize their agricultural production. A share of the possible financial revenues
cannot compensate for the fact that the farm communities are isolated from the agro-industrial system. Plant-related IPR is meant to encourage private investment in crop development. This implies a furthering of the agro-industrialization process, which is considered a strong contributor to the marginalization of the peasantry.

The intensity of the controversy on conservation and plant-related IPR protection is not only determined by their spatial, transnational aspects, but also by a historical dimension. As discussed in chapters two to five, the development of conservation and IPR regulation has been crucial in paving the way for an unprecedented agro-industrial development in the past 100 years. The chapters show that the adoption of this regulation could only take place on condition that the majority of farmers were included in an industrialized production system. This important precondition is not being met during the implementation of conservation and IPR regulation in developing countries. At the end of the 20th century, both types of regulation are being dropped like alien spaceships into regions where farmers do not have the means to adopt industrialized forms of production. They do not view plants as sources of genetic information or 'genetic resources'; neither are they accustomed to Western, individual property rights. Solutions to the PGR conflict are therefore most likely to be found through a thorough understanding of the relationship between industrialized and non-industrialized agricultural production systems.

Notes

1 Monsanto's CEO Verfaillie (1997) remarks: "Why is Monsanto interested in sustainability? The simple answer is that we believe current models of economic growth are a dead-end street. We know the human race can't go consuming resources the way we have for generations, due to absolute constraints on the earth's biological and physical systems ... We must acknowledge that there are limits to what the earth can provide." DuPont's Internet homepage on "safety, health and the environment" contains a similar message. "Recognizing that the Earth's resources are limited and that conservation is necessary for human survival, many with diverse views are coming together to work on the issue of common interest ... Only those companies and industries that provide value to society in a way that is protective of the world's resources will be allowed to operate into the 21st century." (www.dupont.com/corp/gbi-company/she/views.htm#sustain)

2 The International Agri-Food Network promotes cooperation between major international agro-food organizations, including the international plant breeders' association (ASSINSEL), the International Seed Federation (FIS), the Global Crop Protection Federation (GCPF), the International Fertilizer Industry Association (IFA), and the International Federation of Agricultural Producers (IFAP) (IAN, 1998).

3 In Chile, around 15 per cent of the population live in rural areas. In Colombia this figure is 25 per cent.

4 See especially Art. 63 and 330 of the Colombian Constitution (Republica de Colombia, 1993).

5 In Chile, plant variety protection (PVP) legislation was enacted in 1994 (Ministerio de Agricultura, 1994), and in Colombia in 1995 (ICA, 1995). The Chilean PVP legislation replaced a previous, hardly enforced, PVP system, which had been adopted under the military regime in 1977. In Colombia, PVP was introduced through an Andean Pact decision to establish a common regime on PVP, in October 1993 (Comisión del Acuerdo de Cartagena, 1993a). In Chile a new patent law was enacted in 1991 (Ministerio de Economía, Fomento y Reconstruccion, 1991); Colombia's patent law was modified on
the establishment of a common regime on industrial property protection among the Andes Pact countries in 1993 (Comisión del Acuerdo de Cartagena, 1993b). Plant varieties are explicitly excluded from patent protection in Chile, but explicitly included in the Colombian law.