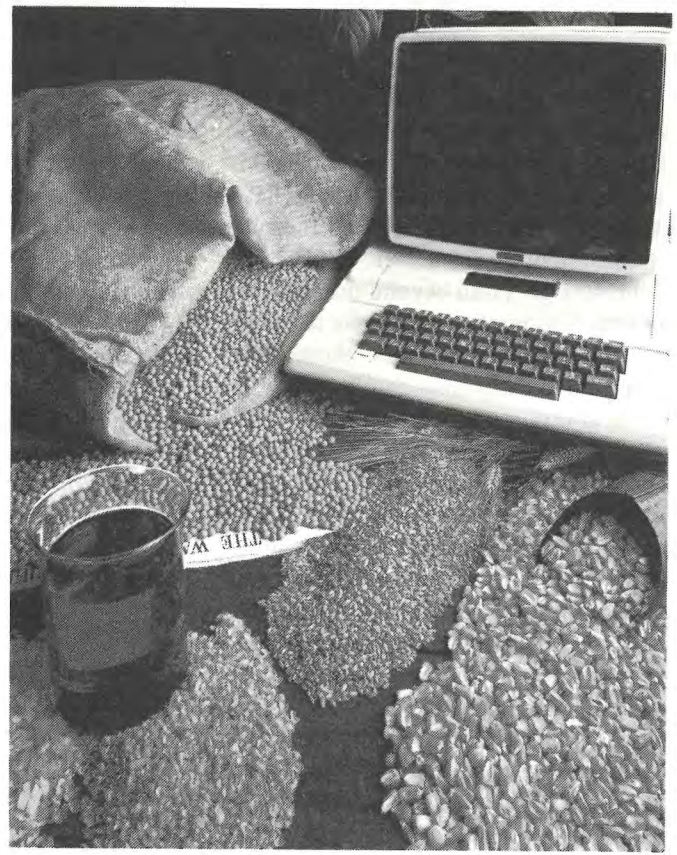




From the World of Annual Reports:
Sandoz 1981, From Northrup King Co's cereals research centre at Yuma, Arizona (top left); Anderson Clayton 1977, In the Boardroom (top right); Diamond Shamrock 1981, The life sciences research center in Concord, Ohio (bottom left); Central Soya 1981, "Commodity Operations", (bottom right).





The new seed monopolies

By Horst Schilling
Translation by RMR

The large capitalist corporations are increasingly diversifying their activities. During the last decade they have penetrated the seeds business on a large scale.

In this article Horst Schilling looks at the companies that are now completely dominating research, production and marketing in this field. He particularly emphasizes the negative effects of this development on the countries of the »Third World«, and evaluates the possibilities of breaking the power of the transnational corporations.

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Over the last two decades an important facet of the development of large capitalist corporations has been their *diversification*, stemming from enhanced economic concentration. With the speed up of technological innovations this process has acquired even greater momentum and is intimately meshed with the *internationalization* of capital. The diversification and geographic expansion of the monopolies aim at manifold and concrete objectives:

- to secure and improve their raw material supply base
- to safeguard against crisis in their respective sectors
- to avoid overcapacity
- to employ cheap labour
- to expand their market shares
- to stabilize distribution and marketing operations
- to create new possibilities for research and development, and
- to use existing research capabilities more effectively.

In short: profit maximization.

The rationale for diversification

With the international balance of power rapidly changing and the strides in technology, international monopoly capital is not only striving to expand its capital investment. It also wants to control and dominate economic sectors which are crucial for boosting labour productivity and opening up new raw material resources. Monopoly capital tries particularly to dominate fields important for maintaining political stability, which is another way of shaping up imperialism and stemming the tide of socialism.

The following article attempts to illuminate these processes at work by investigating one specific field namely plant growing and seed breeding.¹ Compared to other commodities it may appear relatively unimportant. It shows, however, that often diversification is not just an incidental result of the search for new investment fields, but that very often long-term conceptions of a political and economic nature are more basic.

Furthermore, it shows monopoly capital's efforts to achieve leading positions in scientific and technical research that are of vital and strategic importance for human society.

Finally, this case history indicates that in pursuit of its goal the TNCs engaged in seed research and development exposes hundreds of millions of people to poverty and hunger and imperils humanity's very existence.

The big offensive

In the past, plant breeding and seed propagation were mainly undertaken on farms as well as in scientific and state institutions, i.e. in public institutions. At the same time cooperative and private capitalist growing and propagating enterprises emerged. But those were modest in size compared to the gigantic monopolies in industry, trade and banking.

In the early 70s many family and smaller capitalist enterprises in plant breeding, seed propagation and distribution relinquished their businesses or were taken over by capitalist enterprises. But many of those having taken over smaller businesses were themselves absorbed by even larger firms. A 1978 US report states:

»Over the last 10 years, at least 30 seed breeding companies with an annual turnover of 5 million USD or more were taken over by multinational companies from outside the agricultural industry.«²

Similar developments could be observed in other capitalist countries. In Great Britain e.g. the Ranks Hovis Mc Dougall group bought out more than 100 plant breeding enterprises within a very short period of time, thus turning into a real giant in this branch.³

The new seed corporations

Today, more than 20 international companies belonging to monopoly groups with a yearly turnover of more than 500 million USD are known to have started business in seed growing (cf Tab 1, p 48f).

Those monopolies come from various fields:

- trade in food, grain, and fodder: like Cargill (USA), Central Soya (USA), Continental Grain Co (USA), and Tate & Lyle (Great Britain);
- Food companies like Anderson Clayton (USA) and Ranks Hovis McDougall (Great Britain).
- Chemical firms as Ciba-Geigy Ltd (Switzerland), Union Carbide (USA), Celanese (USA), Monsanto (USA), and Olin (USA);
- Pharmaceutical firms as Sandoz (Switzerland), Upjohn (USA), and Pfizer (USA);
- Oil giants as Royal Dutch/Shell (Great Britain/Netherlands), Occidental Petroleum (USA), and Diamond Shamrock (USA).

The EMC group (France) mainly committed to mining, the FMC group (USA) mainly producing machines for agricultural and food industry, and the highly diversified ITT group (USA) have also joined the plant breeders.

It is remarkable that not only food and agricultural machinery firms dominate the "seed industry" but also firms in the chemical and pharmaceutical field with 12 out of 23 groups having an annual turnover of more than 500 million USD belonging to this group.

One of the world's largest and most influential petroleum corporations, the Royal-Dutch/Shell, plays a leading role. In 1978 it had a turnover of 44 100 million USD. Through its wholly owned subsidiaries Nickerson Seed Co and Shell Petroleum it now controls 8 large seed companies in Great Britain and 3 in the Netherlands. Nickerson Seed Co in turn owns 100 per cent of the central seed growing company International Plant Breeders, which also runs North American Plant Breeders together with the American chemical group Olin in the US. It also cooperates in breeding with French companies via its subsidiaries in Canada, Mexico, Brazil and Japan.

The roots of profitability

Why did important TNCs turn towards plant breeding and seed propagation in the late 60s and early 70s?

Perhaps the most important reason is scientific progress notably in modern genetics. Simultaneously breeding processes became more complicated and expensive, making it more difficult for smaller breeding companies to apply these techniques, since their capital base was small as well as their scientific research capability. Towards the late 70s in the US costs for breeding a new plant variety cultivated for agricultural use were estimated at 2 million USD.⁴ But because of market uncertainty as to whether a special variety is able to break into the market not only one specimen had to be produced but as many as possible. This obviously demands an even higher capital investment which is only profitable if it is possible to propagate and distribute many varieties on a large scale.

Research and distribution

There is a connection between progress of breeding research and rapid distribution of newly developed high yield and hybrid varieties of grain. Consequently, a decreasing number of farmers are able to reproduce their seeds themselves. Every farmer buying and sowing hybrid seeds will have to buy seeds again the following year. Other high yield varieties require this new purchase after at least 3 to 5 years. Thus, under the influence of breeding processes, the global capitalist seed market has been rapidly expanding standing at around 10 billion USD in 1978.⁵

Because of the stability of the demand for food as well as for agricultural seeds a secure market with excellent possibilities for sale of seeds came into existence.

The «Green Revolution» and new markets

In the wake of the «Green Revolution» new seed markets were created in developing countries by introducing newly

bred high yielding grain varieties. In 1974 specialists of the UN agricultural organization FAO estimated that up to 1980 the demand for seeds of HYV grain (high yielding variety) - bred especially for developing countries - would increase: for wheat by 60 per cent to 700 000 tons for rice by 50 per cent to 230 000 tons for maize by 40 per cent to 200 000 tons.⁶

According to other estimates, in 1980 agriculture of developing countries invested about 7 billion USD in improved seeds.⁷

It would be difficult to disagree with what the Canadian development expert P.R. Mooney said about the «Green Revolution»:

«The rapidly increasing demand for HYV seeds and the demand for agricultural-chemicals that increased with the development of such seeds makes it possible for chemical groups to establish world-wide distributing organisations that are often subsidized by governments.»⁸

Another important reason that enhances TNC participation in the plant and seed breeding business is that new varieties (more prone to diseases and parasites than domestic varieties) also require the production of plant-protective agents. At the same time, those new varieties demand more fertilizer and other agricultural-chemicals. Especially during the 60s this was important for the chemical industry of imperialist countries as sales on domestic markets stagnated at the time.

In 1967, a well known American economist declared that if the «Third World's» demand for fertilizer increased to only one fourth of that of developed capitalist countries' the US would be able to increase its annual fertilizer exports from 0.25 billion USD to 7 billion USD.⁹ Confirming this view the former chief economist of the Office for International Development, US Department of Agriculture, J W Mellov, declared that the entire programme for the «Green Revolu-



The International Rice Research Institute at Los Banos, 40 miles from Manila in the Philippines is one of the world's leading institutions for the study of rice culture. It was founded in 1960 and is sponsored by both the Ford Foundation and the Rockefeller Foundation.

retaining decisive influence within CGIAR. As CGIAR controls *International Bureau for Plant Genetics Resources* (IBPGR) as well as ten affiliated international research institutions (including two institutes for life stock breeding), it is equally possible for the TNCs to influence policy and appointments to senior posts.¹² With but one exception all directors of the eight plant breeding institutes were appointed to their posts with the aid of these foundations.¹³

In 1979, the ten research institutes affiliated to CGIAR had financial assets of around 100 million USD (as compared to 6 million in 1968). They closely cooperate with other international institutes and exercise influence on research work of national institutes in several developing countries.¹⁴ CGIAR institutes deal with almost all areas and agro-climatic zones of the «Third World» (cf Table 2, p 50f).

Thus, the TNCs enhanced their power by centralizing agricultural research in developing countries. They came to exercise an extensive control in this field vital for many developing countries and influenced research and breeding efforts of those institutes utilizing their research findings for their own purposes.

The price of success

The TNCs entered the seed business when new varieties succeeded, partly because of their higher quality and superiority in comparison to previous varieties, but also because of the promotion they received by TNCs within the framework of development programs. After they had secured control of research they switched to control over management, production, and marketing. They either purchased breeding, propagating, or trade enterprises and if this proved unattainable they took over marketing by contracting producers. The latter applies to Mexico which is still the country producing most of the HYV wheat. Most of the country's export business is handled by international grain monopolies although seed breeding is

tion» was «in the first place a fertilizer sales project».¹⁰

Also the «*US News & World Report*», stated American TNCs to believe that:

«one of the most important results of the Green Revolution is the increased demand in US made agricultural machines, fertilizer, pesticides, irrigation installations and agricultural equipment.»¹¹

The «Green Revolution» described as an «action to assist developing countries» and «a contribution for the solution of developing countries' food problems» turned out to be highly profitable for agri-business TNCs.

Bilateral and multilateral development programs promoted the political and financial expansion of those monopolies within the «Third World». Over a period of two decades they were able to organize a world wide marketing system for seeds, agricultural-chemicals and farm equipment which today allows them to sell their products at high profits in Africa, Asia and Latin America.

Control of research

Significantly, TNCs initiated and influenced the breeding of new grain varieties long before they themselves actually entered the seeds business, notably the giant American firms.

The first research institute concentrating on products suitable for conditions in developing countries was the *International Centre for the Improvement of Maize and Wheat* (CIMMYT) in El Batan, Mexico, that played an important role in breeding HYV. CIMMYT started its work with financial support of the *Rockefeller Foundation* in 1943. In 1956, the *Ford Foundation* became active in this field when starting its so called Indian program.

Both institutions cooperated when they set up the *International Rice Research Institute* (IRRI) in Los Banos, Philippines, in the late 50s. Early in the 60s they were joined by the *Kellogg Foundation*. By 1969 the former two foundations had financed the creation of two further institutes, in Nigeria and Columbia (cf. Table 2).

When it became obvious that breeding research was successful but also that costs increased steadily the groups concerned decided to shift the financial burden to the United Nations. Robert McNamara, long standing member of the Ford Foundation, used his influence as president of the World Bank for creating a syndicate consisting of UN organisations, national governments, and foundations. Thus the *Consultation Group for International Agricultural Research* (CGIAR) was founded in 1971.

It supported the foundations in getting rid of their financial commitments while

Developing countries are heavily dependent on import of agro-chemicals.

Left to right:

*A Monsanto herbicide plant in the US;
A Shell training course in Zambia for
"effective and safe" use of pesticides;
Spraying of herbicide manufactured by
Monsanto.*

mainly done by farmer cooperatives controlled by the »National Board for Seed Breeding Promotion«. The US companies Cargill and Continental Grain Co are the leading firms in this business. They control most of Mexican seed output by granting loans to cooperatives and farmers; and by »forward arrangements«, i.e. contracts that bind the agricultural producers to such companies.¹⁵

Restrictive practices

Trade mark protection for new plant varieties assisted the giant firms to enter this new field. Such penetration encountered little opposition by established small and medium sized businesses.

Until the late 50s, no trade marks comparable to patents for industrial products existed for newly bred varieties, either on a national or on an international scale. Only in December 1961, the »International Convention for the Protection of New Plant Varieties« was drawn up, supported by the monopolies. This convention provided the first legal basis for private breeders demanding a licence fee for their new varieties, and for controlling their distribution.

At the same time smaller seed companies suffered as the larger firms were able to deny licences for propagating the most sought after varieties and in other cases demanded licence fees that were not within the capacity of these firms. On the other hand the monopolies make it difficult for small companies to gain legal protection for their varieties - if they are at all able to breed new ones - and to market them.

Thus the bigger companies are protected against the innovations of the smaller companies and from competition. The upshot of these trademark and marketing practices means that the TNCs are ideally positioned to drive the smaller companies off the market and ultimately to annex them.¹⁶

Although some capitalist countries hesitated to adopt this restrictive plant breeding legislation (some of them have

still not accepted it) the connection between this legislation and the monopolizing of seed breeding is quite obvious. Immediately after countries had accepted these laws concentration was speeded up. Late in 1970, after the »Act on the protection of plant varieties« was passed in the US, the number of purchases of seed breeding companies rose so rapidly that the »American Seed Trade Association« held a special symposium dealing with the problem »How do I sell my seed company?«. ¹⁷ According to reports from Britain, one group alone - Rank Hovis McDougall - bought 84 companies the first week after the act on plant breeding was passed.¹⁸

Perils of concentration

The following highlights the implications of concentration by TNCs, with specific attention focused on the implications of such practices on farm output.

This has become a TNC imperative as the TNCs are attempting to get a stranglehold on the supply of food by the control and management of seed selection and variety. This applies not only to developed capitalist countries but also to »Third World« countries.

The costs of genetic uniformity

Concentration of seed breeding in the hands of a few TNCs results in a rapidly increasing genetic uniformity. Companies which dominate breeding of certain varieties are concerned with maximising acreage under these varieties to force competing varieties off the market.

Data of the US Office for the Protection of Plant Varieties is illustrative. From the date the »Act on the Protection of Varieties« was passed until March 1979, 562 new patent certificates were issued. About one half of them went to 17 companies that had been most active in buying seed breeding companies in recent years 72 per cent of those certificates were related to only 6 varieties promoted, and sold on the American market

by only a few TNCs. Their dominance is also underlined by the fact that only 9 per cent of the certificates were issued to public institutions such as universities and state research institutions.¹⁹

Farmers in main farming areas often grow only one or two varieties because of trade contracts and advertising. An increasing danger of epidemic disease results from this uniformity of varieties. This is especially serious in areas where monoculture is prevalent as in North America, Australia and other regions of the capitalist world. American agricultural experts have pointed out that over the last two decades certain plant diseases (notably food grains) have rapidly increased with longterm adverse implications on the US food supply.²⁰

During the 70s the US National Academy of Science made two studies investigating the causes for epidemic diseases.²¹ Both studies note that American agriculture shows »a remarkable genetic uniformity and therefore a remarkable vulnerability« and concluded that »influential economic and legislative powers have caused this uniformity«. ²²

In the case of major crops a limited number of varieties dominate large cultivated areas, a trend more discernible in Canada than in the United States.²³

Marketing agents

Very often the large international monopolies not only supply seeds but are also the main buyers for farm products, as in the case of Cargill and Continental Grain. Such companies operate in a very restricted competitive milieu and are thus able to determine the price of seeds sold and the price paid to farmers for their products.²⁴

Impact of farm chemicals

Large seed companies are not primarily concerned by crops being increasingly prone to diseases and parasites because of uniformity. After all, farmers have to face resulting losses. And what is more, large



seed/grain traders even make additional profits by shortages caused by crop failure. Groups producing agricultural chemical products also expect an increased demand for plant-protective agents such as pesticides, insecticides, and herbicides as a result of the plants' increased vulnerability. And there are critics that have even alleged that the TNCs have bred varieties that are highly dependant on farm chemicals.²⁵

Developing countries are particularly affected by their dependancy on chemical and pharmaceutical products because they have to be imported. Whereas they use 20 per cent of the world's pesticides and insecticides production their own share in producing those plant-protective agents amounts to merely 3 per cent. But their real demand is not yet met at all. FAO estimates have expected their demand to increase from 160 000 tons in the early 70s to over 800 000 tons by the mid 80s.²⁶

Developing countries increased their outlays for pesticides from 150 million USD in 1965 to 297 million USD in 1970 and 876 million USD in 1975. Corresponding data for fertilizers are 400 million, 600 million and 3.7 billion USD.²⁷ But those rising costs are not matched by increasing real consumption due to the spiralling price increases for those products. Especially countries poorly endowed in raw materials cannot offset surging prices for farm chemicals by boasting export prices. This has often led to a cut back in fertilizer and pesticide imports resulting in severe setbacks of their farm production. The first big price boom for farm chemicals in 1974 resulted in a fertilizer shortage in developing countries generating a production loss of 15 million tons of grain, an amount that



would have been enough to feed 90 million people for an entire year.²⁸

Consequences for developing countries

Although international plant breeding institutions have contributed much to increasing grain production in a number of developing countries (especially new wheat and maize varieties by CIMMYT and new rice varieties by IRRI), expectations did not always meet the sanguine expectations of the planners.²⁹

»The Green Revolution« was not always profitable. This article is not concerned with the often very negative social economic consequences of the green revolution including: the exodus of farm labour, the rise of tenant farmers, social differentiation and pauperization, uncontrolled urbanization, export oriented production replacing food production for domestic use, prevention of a revolutionary change in agricultural conditions, the promotion of large scale plantation capitalist agriculture that are some of the salient hallmarks of the »Green Revolution«.³⁰

Very often the increase in agricultural output has not been forthcoming as the HYVs demand ever larger amounts of fertilizer, water, and plant-protective agents which cannot be produced by the developing countries themselves on the scale required. Consequently, smaller farming businesses have often a relatively low yield. HYV output is sometimes even lower than with domestic varieties resistant to disease, parasites, and drought with their seeds being even cheaper for the farmers.

Genetic impoverishment

Genetic impoverishment threatening developing countries is another negative as-



pect. Most of our plants originate from tropical and subtropical regions that are still producing a vast variety of plants.³¹ This genetic variety which is of vital importance for mankind is now imperilled. Traditional varieties are not only driven off the market but also eliminated by HYV imports from commercial interests.

New seeds are praised for producing higher yields, so very often farmers use up their own seeds or leave them to rot thus making themselves dependant on buying seeds while domestic varieties that have been grown for centuries are really wiped out. »A whole area's variety can disappear within very few years by production pressure of just one imported variety.«³² But »to the same extent as old varieties disappear and a genetic uniformity spreads throughout third world countries news about sudden devastating crop failures is becoming more frequent«.³³

But other countries, too, are indirectly effected by this »genetic erosion« of the developing countries as they depend on renewing their varieties by genetic material from the developing countries' wild and local varieties in order to maintain resistance to disease, parasites, and drought.

The TNCs penetration

Developing countries are not only affected by biological and agricultural consequences but also by economic and political ones arising from the TNCs »seed industry's« activities. TNCs - in cooperation with imperialist governments - use their monopoly in seeds for exercising economic and political influence on these countries. They use HYV seeds for market speculation, source of profit, and as a political lever.

The control of seeds is another important step towards subordinating and

integrating these countries into the global market:

»Anyone in control of seeds is well on the way to controlling the whole food system: which cultures are raised, which 'inputs' are employed and which products are sold.»³⁴

An international working team of scientists stated:

»If a genetic variety of a cultured plant is reduced dependency on societies producing this culture is increased.»³⁵

Other scientists reached the same conclusion:

»Any person or group controlling successfully a certain variety of genetic resources - whether it is stored in a cold-storage depot or is grown on a certain marked off area - exercises indeed an almost absolute political and economic power.»³⁶

The »International Coalition for Development Action» (ICDA) concluded from »large American and European enterprises gaining control over agricultural plants' genetic resources» that »The security of the world's food is put at risk.»

The international seed groups try to strengthen their monopolies by employing gene banks that have a long term effect and are partly organized and financed by either imperialist governments or more often by the TNCs themselves. This applies to American as well as to West-European enterprises. All of them are collecting a range of germ plasm of plants they are interested in. But they keep quiet about the varieties and quantity of genetic material contained in this plasm. According to a FAO report, just one enterprise (United Brands formerly United Fruit) possesses about two thirds of the world's banana germ plasm.³⁷

While those activities are important for preserving genetic material that otherwise could get lost one must not neglect dangers arising from those gene banks

being controlled or owned by TNCs that are able to decide who will have access to genetic material and who will not.

Opposition unites against monopolies

Even DME scientists have come to recognize that TNC influence on plant breeding and seed production might cause »irreparable damage to the world's food basis».³⁸ They are for »international cooperation guaranteeing Third World countries control of their own plant genetic heritage at the same time allowing First World countries fair access to plant material they need».

This opinion stems from scientists realizing that - on a long term basis - industrial capitalist countries depend upon developing countries' genetic resources. According to recommendations of ICDA.³⁹

- a global campaign, under the auspices of IBPGR, for the collection of germ plasm of all cultured plants and their wild varieties should be started immediately;
- the material should be stored in those countries that collected it. It should be carefully registered, stored and rejuvenated in national gene banks that will be partly or completely financed by an international fund for developing countries;
- suitable UN measures declaring all plants and the whole plant genetic material as common heritage and property of mankind prohibiting any kind of restrictive control by patents, trade marks etc. Free access to plant material is to become a basic human right;
- the UN Centre on Transnationals should formulate a code of conduct declaring seeds as being vital to national security interest and banning activities of TNCs in this field;
- the »code of conduct for technology transfer» that is being drawn up by UNCTAD should guarantee the right of every nation to protect its national biological resources against commercial exploitation;

● the UN Centre on transnationals is being asked to make a study on the restrictive practices within the »seed industry» and its interweaving with agro-chemistry and the pharmaceutical corporations. It should look at the restrictive practices exercised by TNCs on plant breeding legislation and their control over genetic resources.

It also recommends how peoples and governments of developing countries will have to secure their sovereignty over their vital genetic resources.

In recent years, peasants and farmers of developed capitalist countries have started a movement against restrictive plant breeding legislation. This opposition is especially prominent in countries as Australia, Ireland, and Canada where such legislation is being prepared.

But in this field, too, the TNCs dominating influence on governments becomes evident. Since 1978, for example, there have been numerous demonstrations of farmers throughout Canada against the introduction of this legislation. Farmers are supported by the Canadian National Farmers Union and well-known scientists. But the Federal Ministry for Agriculture still supports demands of the large seed breeding companies of the Canadian Seed Trade Association which seek to introduce legislation similar to that of the United States and Great Britain.

Monopoly capital is also using its activities in seed breeding for gaining access to another field of agricultural production, that is poultry farming. Similar to hybrid breeding it demands large-scale research and production facilities to be able to use scientific-technical progress effectively, and guarantees extra profits using latest findings in breeding.

Some tentative conclusions

Comparing the possibilities of modern plant breeding in favour of increasing agricultural production with the actual food situation in a number of countries,

we have reached the following conclusion:

● Where TNCs control science and where their profit interests influence the utilization of scientific-technical findings, unfavourable consequences often arise, for nature and population, and many social problems grow worse instead of being solved.

● The »food-power-doctrine« is an imperialist strategy for misusing food as a political weapon and implies monopoly control over the seed business. Developing countries suffering acute food shortages are to be made more dependant by restrictive practices.

There is, however, a rising level of awareness of the perils of these policies as seen in organized resistance to these restrictive practices at both a national and international level.

More and more progressive scientists, from all parts of the world, oppose the activities of the TNCs. And the peoples of Africa, Asia, and Latin America fighting for economic and social sovereignty, also fight for control of their natural resources which implies an aim to protect their genetic resources from the interference of international monopolies.

They try to reduce the influence of TNCs on existing international research institutions and to found national institutions and institutes of developing countries not dependant on monopolies that develop plant breeding and conserve genetic resources.

»Third World« countries receive substantial assistance from socialist countries, especially the Soviet Union, which have reached a high level in biological and genetic sciences and plant breeding and have vast genetic reserves. According to estimates by Western scientists, the Soviet Union, having started conserving genetic material very early, now owns the most extensive seed collection of wild and cultured plants. This fact is one of the reasons why it will be impossible for TNCs to get a total monopoly in the gene material of agricultural plants, which are one of

the most important fundamentals for future nutrition of mankind.

Notes:

¹ The activities of the TNCs in the seed industry were first made known to a larger public at a conference arranged by ICDA in the Canadian province of Saskatchewan in November 1977. At a conference arranged by UNCSTD in Vienna, August 1979, the Canadian development expert Pat Roy Mooney supplied material on the build up of a genetical industry by certain TNCs and that they were well on their way to monopoly control of the whole seed market. A large number of facts and examples in this article are taken from a book by P.R. Mooney: *Seeds of the Earth – a Private or Public Resource?*, published in Ottawa in 1979.

² R.P. Mooney, *ibid* page 55–56.

³ *Ibid*.

⁴ R. Menninger, *New Crops in The Co-Evolution Quarterly*, Autumn 1977, p. 76.

⁵ *Die Rheinpfalz*, Ludwigshafen, 1979-09-01.

⁶ FAO, Documentation for the World Food Conference, Rome 1974.

⁷ FAO, *Agriculture: Toward 2000*, Rome 1979.

⁸ R.P. Mooney, *op. cit.* p. 48.

⁹ Quoted from M Perelman, *Farming for Profit in a Hungry World*, Landmark series 1977, p. 170.

¹⁰ *Ibid* p. 169.

¹¹ *US News and World Report*, February 7, 1975, p. 5–6.

¹² Cf. *IPW Berichte* 6/1979, p. 50.

¹³ N. Wade, *International Agricultural Research*, in *Food: Politics, Economics, Nutrition and Research*, P.H. Abelson 1975.

¹⁴ S. Wortman – R.W. Cummings jr, *To Feed this World*, Baltimore 1978, p. 129–134.

¹⁵ D. Morgan, *Merchants of Grain*, New York 1979, p. 240–241.

¹⁶ P.R. Mooney, *op. cit.* p. 62.

¹⁷ *Ibid*, p. 55.

¹⁸ *Ibid*.

¹⁹ *Ibid* p. 57.

²⁰ G. Wildes: The Endangered Genetic Base of the World's Food Supply in *The Bulletin of Atomic Scientists*, February 1977, p. 11.

²¹ US National Academy of Sciences, *Genetic Vulnerability of Major Crops*, Washington 1977, and *Conservation of Germ Plasm Resources: an Imperative*, Washington 1978.

²² *Ibid*.

²³ The Prairie Pools, *Crop Acreage Report*, Ottawa 1978.

²⁴ D. Morgan, *op. cit.*

²⁵ P.R. Mooney, *op. cit.* 86 ff.

²⁶ FAO, *The World Food Problem*, p. 49.

²⁷ FAO, *Trade Yearbook*.

²⁸ M. Perelman, *op. cit.* p. 174.

²⁹ The varieties of wheat developed by CIMMYT are already used on more than 30 million acres around the world. The new varieties of corn are grown in more than 50 countries.

³⁰ Cf. *Allgemeine Krise des Kapitalismus*, Berlin, 1976, p. 148 ff; E. Rechtziegler: "Grüne Revolution" in *Entwicklungsländer – Realitäten und Widersprüche in IPW – Berichte* no. 5, 1973, p. 32 ff.

³¹ Most plants used in modern agriculture originate from a few areas of the world: the Mediterranean basin, the Middle East, Ethiopia, Afghanistan, India, Burma, Central China, Malaysia–Indonesia, Guatemala–Mexico and the Peruvian Andes. These are also areas most of which today belong to the "Third World".

³² P.R. Mooney *op. cit.* p. 17.

³³ *Ibid* p. 43.

³⁴ *Ibid* p. 44.

³⁵ *Ibid* p. IV and p. 28.

³⁶ *Ibid* p. 28.

³⁷ *Rheinpfalz* 1979-09-01.

³⁸ *Ibid* p. 50.

³⁹ *Ibid* p. 105.

⁴⁰ *Ibid*.

⁴¹ *Ibid* p. 105–107. ■

Major TNCs involved in seed business 1980

Turn-over 1980 in USD million, employees in 1980.

Company (head office)					Major production or major econ. activities	Activities in seed breeding	Other activities in agribusiness
Rank World	Rank USA	Rank W Eur.	Turn-over	Employees			
Royal Dutch/Shell (Great Britain/Neth.)					Oil, chemical products	Owns or controls at least 30 large companies in seed breeding and seed trade, i. a. Nickerson Seed Co, International Plant Breeders in GB, Zwaan in the Netherlands, North American Plant Breeders, Agripro Inc in USA	Agricultural chemicals, especially pesticides, herbicides and fertilizers.
2	..	1	77 114	161 000			
ITT (USA)					Electrical engineering, machines (very diversified)	Owns O. M. Scotland & Sons and Burpec Seeds and is engaged in forestry seed breeding	Bakery factories and food trade
21	..	13	18 530	348 000			
Occidental Petroleum (USA)					Oil, natural gas	Holds shares in various seed breeding companies	Agricultural chemicals and fertilizer trade
47	..	20	12 476	34 700			
Cargill (USA)					Grain and grain products trade (largest enterprise in the world in this field, handles more than 25 % of US grain export)	Purchased Dorman Seeds and PAG in the USA and Krocker Seeds in Canada, esp. active in breeding hybrid wheat	Mills, oil mills, production and trade in fodder, transport and storage of various agricultural products, poultry farming, owns more than 20 food enterprises in 14 countries outside the USA
..	10 000	..			
Union Carbide (USA)					Chemical products, metals	Purchased Keystone Seed Co, Jacques Seeds and Amchem Products, produces esp. maize seeds	Agricultural chemicals (insecticides, pesticides) and packaging for food stuffs
58	27	..	9 994	116 105			
Continental Grain Co (USA)					Grain trade	One of the most important dealers and exporters of HYV seeds (has contracts with numerous seed producers, esp. in Mexico)	Bakery and fodder factories, trade in grain, oil fruits and fodder, more than 25 subsidiaries in 10 countries, i. a. grain mills in Venezuela, Ecuador, Puerto Rico, Guadeloupe and Zaire
..			
Ciba-Geigy Ltd (Switz.)					Dye-stuffs, chemicals, pharmaceuticals	Owns large plant breeding companies in Canada (i. a. Funk Seeds Intern., Stewart Seeds), Argentina and Brazil, produces esp. maize and sorghum seeds, sold seeds at a value of 241 million CHF in 1977	Agricultural chemicals in 1977 world-wide turn-over of 2 469 million CHF, i. a. plant-protecting agents at a value of 1 972 million CHF
97	37	..	7 113	81 184			
Monsanto (USA)					Chemical products	Purchased Farmers Hybrid Company	Agricultural chemicals (herbicides, insecticides, growing regulators, fertilizer) and cattle breeding, owns more than 987 factories in 21 countries and 76 trade agencies in 42 countries outside the USA
107	48	..	6 574	61 836			
FMC (USA)					Industrial and farming equipment	Purchased Seed Research Association	Agricultural chemicals, agricultural machines and food
237	103	..	3 482	43 799			
Celanese (USA)					Chemical products (esp. fibres, plastics and polymere specialities)	Purchased Cephil Inc, Moran Seeds and Marris Seeds	The group's R&D programs deal with the use of polymers in agriculture and food industry, owns factories in 15 countries and delivers to 70 countries
245	107	..	3 348	32 800			

Ranks Hovis McDougall (Great Britain)	Food industry	RMMS deals esp. with grain seeds, according to their own reports they deliver to Great Britain seeds for 500 000 ha	Mills, bakery factories, restaurants and a network of country trading companies selling seeds, fertilizer and agricult. chemicals
254 .. 87 3 279 54 063			
Diamond Shamrock (USA)	Petroleum, natural gas, chemical prod.	Purchased Taylor-Evans Seed Company	Antibiotics, fungicides, fertilizer additives
264 119 .. 3 143 12 654			
Pfizer (USA)	Pharmaceuticals	Owns i. a. Clemens Seed Farms, Jordan Wholesale Co, Trojan Seed Co and Warwick Seeds, deals with breeding of maize, oatmeal and soybeans, trades genetic material for plants and animals	Organic chemicals for food and beverages industry and veterinary medicine, owns 140 factories in 40 countries. Turn-over for agricultural products in 1977 310 million USD, out of which 2/3 were spent outside the USA and Western Europe
276 126 .. 3 029 41 200			
Sandoz (Switz.)	Chemical products (esp. pharmaceuticals, dye-stuffs and agricultural chemicals)	Purchased i. a. National-NK, Rogers Brothers and Northrup King Seed. World-wide trade in seeds in 1977 SFR 464 million (esp. hybrid maize, hybrid sorghum, sunflower, soybeans, wheat, lucerne and vegetable seeds)	Agricultural chemicals (esp. herbicides) which had an annual turn-over of 250 million CHF in 1977
290 .. 94 2 926 35 459			
Tate & Lyle (Great Britain)	Agricultural trade	Purchased Berger & Plate Seed Company	Storage, trade and shipment of agricultural products, owns sugar and starch factories, malting-houses and stores, has subsidiaries in 21 countries (esp. in Africa and the West Indies)
.. .. 2 797 16 400			
Olin (USA)	Chemical products	Owns jointly with Royal Dutch/Shell North American Plant Breeders	Biocides, fertilizers and chemicals for seeds
.. 445 195 1 853 21 000			
Upjohn (USA)	Pharmaceuticals	Owns Asgrow Seeds and Associated Seeds, both leading US vegetable seed breeding companies (i. a. peas, beans, tomatoes and sweet maize). Breeds and sells seeds for hybrid maize, hybrid sorghum and soybeans	Agricultural chemicals, agricultural equipment and poultry farming
.. 472 206 1 760 21 900			
Central Soya (USA)	Agricultural trade (esp. grain and fodder)	Owns i. a. Os Gold Seed Co, esp. engaged in maize, sorghum and lucerne seed breeding	Fodder factories, oil mills, production, processing and marketing of poultry, trades pesticides and veterinary medicine. Foreign activities in Latin America and Middle East
.. 476 207 1 744 10 500			
Anderson Clayton (USA)	Food and fodder industry	Owns i. a. Tomaco-Genetic Giants and Acco Paymaster Farms, sells maize, sorghum and cotton seeds to 15 countries. Seeds have 7.5 % of group turn-over	Produces and trades food, vegetable oil and fodder, trades coffee
.. 488 213 1 703 17 300			
International Multifoods (USA)	Food industry and trade	Purchased Baird Inc and Link Bros.	Fodder, veterinary medicine, restaurants, mills, poultry and egg production, meat processing, and cheese production
.. 698 290 1 079 8 549			
EMC-group (France)	Mining	Subsidiary SCPA active in seed breeding	Fertilizer (6.5 % of the world's potash), fodder and agricultural equipment, activities in cattle breeding.
.. .. 810 ..			

<i>Purex</i> (USA)	Household articles	Owns Advanced Seeds, Ferry Morse Seeds and Hulting Hybrids. Produces flour and vegetable seeds for domestic purposes as well as agricultural seeds, esp. hybrid maize	..
.. 394 ..	683 7 200		
<i>Dekalb Agresearch Inc</i> (USA)	Seed breeding	Is one of the leading companies in the USA in hybrid breeding of wheat and maize. Also sorghum, lucerne and fodder grass. Breeding companies in Mexico, Nicaragua, Brazil, Argentina, Italy and Canada	Poultry farming and pig breeding meat processing and marketing, irrigation equipment
.. .. .	361 18 000		
<i>Pioneer Hi-Bred International Inc</i> (USA)	Seed breeding	Subsidiaries Lankhart Inc, Lockett Inc, Peterson and Arnold, Thomas Seed Co have the following shares of the US market: hybrid maize 29 %, hybrid sorghum 11 %, lucerne 8 %, cotton 4 % and soybeans 2 %. Pioneer delivers seeds to more than 100 countries	Poultry farming. Pioneer controls 22 % of the US stock of layer hens' parents, 19 % of chickens and 2 % of broiler parents
.. .. .	281 2 100		

Notes:

- 1) 1976 estimate by P. R. Mooney as company does not have to publish a balance sheet (family enterprise)
- 2) 1978 figures
- 3) 1976 figures by P. R. Mooney
- 4) 1977 figures by P. R. Mooney

References:

- P. R. Mooney, *Seeds of the Earth - Private or Public Resource?* Ottawa 1979.
Fortune, Chicago, May and August 1981 (turn-over, employees and rank).
 Various business reports and press publications.

Table 2

International agricultural research institutes financed and controlled by the Consultative Group on International Agricultural Research (CGIAR)

Head office	Year of found.	Research program	Active in agriclimatic zones	Estim. budget billion USD	Financed by
CIMMYT (International Centre for Improvement of Maize and Wheat)					
El Batan, Mexico	1943 ²⁾ 1964	Wheat, maize, barley triticale	Rain and irrigation regions. Subtropics, tropics	17.1	EL: 27 F: 1, 3 IO: 4, 5, 9 DCC: 13, 14, 16, 21, 22, 23, 24, 25
IRRI (International Rice Research Institute)					
Los Banos, Philippines	1960	Rice, repeated cultivation	Rain and irrigation regions. Temperate zones and tropics	16.1	EL: 27 F: 3 IO: 5, 6, 7, 8 DCC: 11, 12, 13, 14, 16, 20, 22, 23, 24, 25, 26
IITA (International Institute for Tropical Agriculture)					
Ibadan, Nigeria	1968	Maize, rice, soybeans, Lima beans, manioc, yams, sweet potatoes, cultivation systems	Rain and irrigation regions. Low-land tropics	15.1	EL: - F: 1, 2, 3 IC: 4, 9 DCC: 12, 13, 16, 18, 19, 21, 22, 23, 24, 25
CIAT (International Centre for Tropical Agriculture)					
Palmira, Colombia	1968	Beans, manioc, maize, rice, cattle and cattle fodder, pigs	Rain and irrigation regions. High-land tropics	15.0	EL: - F: 1, 2, 3 IO: 4, 9 DCC: 12, 13, 16, 18, 19, 21, 22, 23, 24, 25

WARDA (West African Rice Development Agency)					
Monrovia, Liberia	1968	Rice	Rain and irrigation regions of the tropics	2.7 ³⁾	-- ⁴⁾
CIP (International Centre for Potatoes)					
Lima, Peru	1972	Potatoes	Rain and irrigation regions. Temperate to tropical zone	8.0	EL: - F: - IO: 4, 8, 9 DCC: 11, 12, 13, 16, 18, 20, 21, 22, 23, 25
ICRISAT (International Research Institute for Plant Growing in Semi-Arid Tropics)					
Hyderabad, India	1972	Sorghum, millet, peanuts, chide-peas	Semi-arid tropics	12.4	EL: - F: - IO: 5, 6, 7 DCC: 11, 12, 13, 16, 18, 19, 20, 21, 22, 23, 24, 25
IBPGR (International Bureau for Plant Genetic Resources)					
Rome (FAO) Italy	1973	Systematic collection of shoot plasm	Global	3.1	-- ⁴⁾
ILRAD (International Laboratory of Research for Animal Diseases)					
Nairobi, Kenya	1974	Blood disease of animals	Mainly semi-arid tropics	10.4	EL: - F: 3 IO: 4, 5 DCC: 12, 13, 16, 18, 19, 21, 22, 23, 25
ILCA (International Animal Breeding Centre for Africa)					
Addis Ababa, Ethiopia	1974	Animal production	Moist to dry tropics	9.0	EL: 27, 28 F: 1 IO: 7 DCC: 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 25
ICARDA (International Research Centre for Agriculture in Dry Regions)					
Syria Lebanon Iran	1975	Wheat, barley, lentils, pop-beans, oil-seeds, cotton, sheep farming	Mediterranians	11.8	EL: 27 F: 1 IO: 4, 6, 7, 10 DCC: 11, 12, 13, 15, 16, 17, 18, 19, 20, 22, 23, 25
IFPRI (International Food Policy Research Institute)					
Wash. D C, USA	1975	Food policy	Global	2.4	-- ⁴⁾
ISNAR (International Support for National Agricultural Research)					
The Hague, Netherlands	1979	Support for national ag- ricultural research progr.	Global	1.2	-- ⁴⁾

Notes:

- 1) In 1977 CGIAR arranged financial contributions from Foundations (F): 1 = Ford, 2 = Kellogg, 3 = Rockefeller International Organizations (IO): 4 = World Bank, 5 = UN Development Program, 6 = UN Environment Program, 7 = International Development Centre, 8 = Asian Development Bank, 9 = Inter-American Development Bank, 10 = Arab Funds Developed Capitalist Countries (DCC): 11 = EEC, 12 = Belgium, 13 = West Germany, 14 = Denmark, 15 = France, 16 = Great Britain, 17 = Italy, 18 = Netherlands, 19 = Norway, 20 = Sweden, 21 = Switzerland, 22 = USA, 23 = Canada, 24 = Japan, 25 = Australia, 26 = New Zealand Developing Countries (DC): 27 = Iran, 28 = Nigeria
- 2) Since 1964 with its present name
- 3) only financed by CGIAR
- 4) no details
- 5) is not a research institute

References:

- R. W. Cummings jr., *Food Crops in the Low Income Countries: The State of the Present and Expected Agricultural Research and Technology*, Working Paper (Rockefeller Foundation), New York, May 1975
 S. Wortman/R.W. Cummings jr., *To Feed this World*, Baltimore/London 1978
 P. R. Mooney, *Seeds of the Earth - a Private or Public Resource?* Ottawa 1979
 World Bank, *Agricultural Research*, Washington D. C., 1981