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Position Paper

Benefits of Using Crop Protection Products with Specific Reference to Habitat Preservation and Biodiversity

INTRODUCTION

History teaches us that the times when man was not able to protect his crops and therefore suffered from a lack of sufficient wholesome food are not so far in the past. The best example of this is the great famine between 1846 and 1851 in Ireland when a million and a half people died as a result of potato blight. Between then and today, research into agricultural science and its practical application has lead to extraordinary progress in food production. Simultaneously, an understanding of the interrelationships among world population increase, higher-yield farming and the preservation of natural resources became essential.

Modern European society is provided with plentiful, readily available, high quality, affordable food. Very few people, however, are aware of and consider the real problems of basic food production at farm level. This has been readily demonstrated by recent public opinion monitoring studies. At the same time, well-fed populations in highly developed countries tend to seek a risk-free existence. Crop protection products (CPPs) are generally seen as risk factors and their benefits taken for granted or forgotten. Any consideration of risk, however, entails a discussion of benefits if the risk is to be determined acceptable or not.

FOOD SUPPLY

In recent years, modern intensive agriculture using man-made CPPs, has achieved the following for mankind:

- Doubled the production of world food calories since 1960.
- Tripled the output of resource-intensive foods such as cooking oil, meat and fruits and vegetables.
- Increased per-capita food supplies in the Third World by 25%.
- Maintained the area of land devoted to agriculture stable at 1.4 billion hectares between 1950 and the present, despite a global population growth from 2.5 billion to 5.5 billion.
- Prevented another 26 million square kilometres of land being devoted to feeding the current population, which itself will more than double by the end of the next century.

Population growth is not the only factor in the increasing demands for high output agriculture. The desire for high protein foods will contribute even more, with perhaps two billion people in emerging countries, largely in Asia, achieving sufficient income to begin upgrading their diets. Only intensive, science-based agriculture can be relied upon to meet these inexorable demands on the food supply.

Nor is it only in the production of food that CPPs are of critical importance. They are also essential in preserving stored staple foods such as rice and other cereal grains. Foodstocks can be kept for years without loss at minimal expense using modern protection methods. These stocks are a pre-requisite for a continuous supply of food at stable prices. Furthermore, such stocks are essential for global food security. One year's drought in America's grain belt in the late 1980's was sufficient to reduce the global food stock level to below the FAO stipulated minimum.

Additionally, urbanised modern society cannot be fed without a highly sophisticated logistical system. This includes well-organised systems of agricultural production, harvest, storage, and transport of highly perishable produce. Without the use of CPPs, the system would quickly break down. Small scale farming with direct marketing to the consumer represents a very limited market niche and cannot guarantee a continuous supply of the enormous quantities of food required by urban-dwelling populations.

HEALTH BENEFITS

Adequate supplies of low-cost fresh fruits and vegetables are man's best defense against "modern" killers such as cancer and heart disease. A high-quality food supply in sufficient quantity, together with steady progress in medical care, is the major factor in man's steadily improving life expectancy and general well-being.

Life-threatening fungal diseases such as rye ergot, which brought agonising death to hundreds of thousands in Europe in the past, and cancers caused by fungal toxins such as aflatoxin, are avoided by the use of fungicides on growing and stored cereal and peanut crops. Recent studies conclusively demonstrate the presence of highly cancerogenic mycotoxins much more frequently in organically grown cereals in comparison to those produced using modern CPPs.

CPPs also save tens of millions of lives by controlling vector-borne diseases such as malaria, schistosomiasis, filiarsis, trypanosomiasis and onchoceriasis, inter alia. Nor is this limited to tropical and sub-tropical climates. Control of disease-bearing insects such as the cockroach in homes, restaurants and hospitals is CPP-dependent, as is the prevention of property destruction by termites and other wood-boring pests in Europe.
Herbicide usage has not only resulted in higher crop yields but an improvement in the working conditions of the farming community, consequently improving their overall health and productivity by reducing the incidence of muscle and skeletal problems. Hoeing may be adequate, even satisfying, in the back garden or the community allotment, but is unacceptable in large-scale farming.

ECONOMIC BENEFITS

In 1993, an economic study published by Prof. Dr. M. Schmitz and Dr. M. Hartmann of the University of Frankfurt, Germany concluded that "...results of an economic audit of the outcome of a strategy of across-the-board reduction in the use of chemical fertilizers and crop protection agents are on the whole poor." It is just such an overall policy of reduction of CPP use that is proposed in the recent CLM study "Towards a Future EC Pesticide Policy", commissioned by Directorate General XI of the Commission of the European Union, and at the same time part of the EU's Fifth Environmental Action Program.
In their study, Schmitz and Hartmann demonstrate that the total economic and environmental losses of this kind of policy far outweigh any presumed environmental gain.
Studies in the United States reach similar conclusions, and generally demonstrate that "extensified" agricultural production generates more disadvantages than advantages for both the consumer and the environment. As an example, in 1982 the only herbicide registered for weed control in lettuce in Florida was withdrawn from the market. Since then, Florida lettuce growers have not had available an herbicide which could be sprayed directly on top of the crop. The herbicide cost $US 20 per acre. Hand weeding has replaced the herbicide at $US 200 per acre, leading to increased costs of $US 2 million per year to the grower, costs which inevitably work their way to the consumer.
Modern agriculture and CPPs play an important role in Europe's economies, leading to a favorable balance of trade between the EU and the rest of the world in the agricultural commodity sector.
European companies dominate in the research for and production of CPPs and employ fifteen thousand people. Many of those employed are highly trained specialists with advanced university degrees working in research and development. This pool of professional scientists is crucial for Europe's future as a cradle of high technology industry.

CROP PRODUCTION

A recent study by Dr. E.-C. Oerke of the University of Bonn has detailed the available productivity of food and fiber worldwide with and without crop protection products. Though his monumental study examines global impact, the effect of withdrawal of CPPs on some crops grown in Europe is selected below.

In wheat, the current loss to diseases, pests, and weeds is 27%, but would rise to 53% without crop protection products. Barley losses would more than double to 40%, as would maize losses, to 52%. In non-cereal crops, potatoes are important in the European diet and economy, representing the fifth most important energy source in the human diet after the main cereals. Globally, about 50% of the crop is used in human consumption and around 30% as animal feed. Potato losses in Europe without CPPs would approach 76%, or about 30 tonnes per hectare in the more productive countries of Europe. Losses such as these would quickly translate into lower availability and consequently higher prices for the European consumer, as well as lower export earnings for European governments. The farmer would suffer as well. In Germany, for example, he would see a 57% reduction in his gross margin. Free circulation of agricultural commodities would also be in jeopardy without the use of modern crop protection chemicals. Citrus, for example, is a major export crop for Southern European countries. Plant quarantine regulations would preclude export of citrus infested with the Mediterranean fruit fly, as happened to California growers a few years ago when the state authorities sought to ban malathion treatment of the citrus groves.

ENVIRONMENTAL IMPACT

CPPs are part of the environmental solution, not part of the problem as many would have us believe. Virtually all of the gains in food production cited in this paper are environmentally sustainable. Low-yield agriculture, without the use of CPPs, is non-sustainable because in the effort to feed the world's population, this inefficient production scenario would require plowing down enormous areas of wildlife habitat.

Contrary to some people's perception and a common claim that CPPs kill wild flora and fauna, this claim is unfounded either scientifically or logically. Older broad-spectrum, persistent CPPs are largely replaced by more narrowly targeted, less persistent chemicals. These have been exhaustively tested in the lab and field for their lack of non-target impact. Dose rates of grams instead of kilograms per hectare and persistence measured in weeks rather than years are more the rule than the exception. A hundred million dollars and many years of research and testing go into a new CPP prior to marketing and use.

CPPs are designed and used to control fungi that would poison food crops and weeds and insects that would destroy them before they could be consumed. Their measured, rather than assumed, impact on non-target species and wildlife is minimal. Wildlife species that have disappeared in the most intensively cropped regions of chemical-based agriculture have been lost because their habitats have been displaced by agriculture itself, not

because of the chemicals used in that industry. The only way to preserve wildlife is to preserve wildlife habitat.
Most of the earth's current species date back to the Cambrian period many millions of years ago. They have successfully evolved and survived through massive changes in climate and habitat. J. Levington of the State University of New York states that "The body plans that evolved in the Cambrian by and large served as the blueprints for those seen today. Few new major body plans have appeared since that time...all the evolutionary changes since the Cambrian period have been mere variations on those basic themes."
Lexington confirms the ability of most species to adapt to changes in their habitat, and states that species flexibility in the face of new conditions is widespread. If this were not the case, resistance would not be an issue needing constant management in the use of PCPs and antibiotics. No species of insect has become extinct by the use of man-made chemicals, even when this was the aim as with malaria vectors.
Lexington further states that "all evidence from living groups of organisms...suggests that contemporary evolution proceeds as fast as ever." This is a clear indication that habitat loss is the only means of destruction of significant numbers of wildlife species, and high yield agriculture and forestry, producing the most product from the least area of land resource is the best way to preserve wildlife diversity.
There is little well-founded evidence that human activity of any sort has had any overall impact on species diversity. Some of the best data is available from the United States where human activity in all spheres, including intensive agriculture and forestry is at a presumed peak level. There, it has been estimated that the number of species of plants, animals, fungi and microorganisms is about 250,000. An estimated 87 vertebrate species have become extinct since 1492, while the U.S. Fish and Wildlife Service currently lists 822 threatened or endangered species, with another 300 candidates. In total, there are approximately 1200 species in the above categories, or about 0.5 percent of the total estimated number of species.
On the other hand, the U.S. Office of Technology Assessment estimated that man had intentionally or otherwise introduced some 4500 species of non-US origin into the American environment. Some are useful (virtually all food crops in the U.S. were introduced species), and some are not, but all increase the biodiversity of the environment. Thus we have an example of a country where agriculture is both chemical and energy intensive, with no evidence that that country's biodiversity has been negatively affected in any significant manner.
Non-chemical organic farming can produce at best 50% of the yield of intensively farmed land using CPPs and chemical fertilisers, and even this level of organic farming yield has yet to be proven possible in a consistent manner on large areas of land. In India, between 1965 and 1990, wheat production increased from 12 to 55 million tonnes. This was accompanied by an increase in farmland area of 9 million hectares (from 14 to 23 million). Without the benefits of the Green Revolution, utilising the best results of plant breeding, crop protection, irrigation, mechanisation and farmer

education, another 40 million hectares of habitat would have been plowed under.

There is no viable or morally tenable way to prevent the doubling of the world's population between now and 2100. Population growth levels off as economic stability increases, as can already be seen in developing countries. Nevertheless, the momentum of population growth will inevitably push global population from the current 5.5 billion to around 10 billion by the end of the next century.

The question therefore is how to provide sufficient food to sustain this number of people, many of whom, with increased affluence, will graduate from low calorie carbohydrate diets to high calorie protein rich diets. The answer cannot come from low-input "sustainable" farming. The United States is probably one of the few countries which would be able to feed its population in 2050 using organic farming techniques, but this would entail disappearance of the US surplus crops which now feed peoples in countries unable to feed themselves.

As stated earlier, high-input farming has managed to feed an increasing population on the same area of land devoted to agriculture in 1950, i.e., 1.4 billion hectares which is approximately the area of South America. The population doubled during this time period. It will double again. The unavoidable fact is that intensive agriculture will need to become even more intensive to meet world demand unless we are willing to see another billion hectares of habitat destroyed to produce the food required.

Rather than making untenable claims about the effect of chemical-based intensive agriculture on natural biodiversity, and assuming we want to preserve, not destroy, wildlife, we need to ask just how much land we are willing to see disappear beneath the plow of low-input agriculture.

As has been shown conclusively above, CPPs in intensive modern agriculture actually preserve wildlife habitats in Europe and abroad. The battle to protect the environment cannot be waged in selected areas of the world in isolation. Reducing yield in efficient modern European agriculture will result in overstressing the fragile ecosystems in densely populated, semi-arid countries like those in the Indian sub-continent. According to Dr. D. T. Avery of the Hudson Institute "The only way to save the world's wildlife habitat - and thus to save the wildlife - is by turning high yield agriculture into higher yield agriculture."

Further, it is important to recognise that modern cropping systems based on the appropriate and proper use of CPPs are the most sustainable production methods ever devised. As an example, one of the major global environmental threats is soil erosion. Herbicides used in combination with conservation tillage have reduced this problem by 50 to 98 per cent. Other science-based developments clearly demonstrate that losses of input (energy, fertilisers and CPPs) can be minimised and the fertility of soils improved by integrated farming approaches including the use of CPPs. Intensive farming is clearly not a contradiction to environmental protection and indeed is a sustainable addition to such protection.

CONCLUSION

Too often politicians and regulators are forced by vocal, well-meaning, but poorly informed groups to take policy decisions on the basis of perceived risks without calculating real benefits. We have very briefly put the benefits side of the case for CPPs in this paper. Fairness to this and succeeding generations demands that we plan our policies and make our decisions on the basis of all available factual information. The Crop Protection Industry is prepared to work constructively and in a spirit of co-operation in this process, only awaiting a receptive body of policy makers and regulators in the debate.

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