

Pesticide Action Plans in Denmark

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The first Pesticide Action Plan in Denmark

Intensified agricultural production methods, i.e. increased consumption of pesticides, caught the public eye and media in the mid-eighties. Concerns for the pressure that the pesticide consumption put on health and environment has been a major driving force in the Danish pesticide policies ever since.

The goal of the first Danish Pesticide Action Plan (December, 1986) was to reduce the consumption of pesticides in agriculture by 50 percent over a 10 year period in order to protect people against the health hazards and harmful effects that results from the use of pesticides, and to protect the environment, i.e. flora and fauna on land and in aquatic environments. Another primary goal of the Action Plan was to shift consumption to less harmful products.

The use reduction should be achieved both in terms of amount of active ingredients and the Treatment Frequency. The Treatment Frequency was developed in the mid-eighties because it was realised that the increasing use of low dose products used in grams per hectare was not reflected in the Danish statistics on sold amount of active ingredients. Thus a drop in sales of active ingredient can easily take place at the same time as the number of application - and pesticide load on the environment - increases.

The Treatment Frequency is the calculated average number of pesticide applications in agriculture per year, provided a fixed standard dose is used. To calculate the Treatment Frequency, sales of pesticides and acreage with crop types are needed. A standard dose needs to be fixed for all active ingredients in all crop types in which the active ingredients can be used. The fixed standard doses are based on efficacy trials, and do thus express the doses necessary to control pests to a certain degree. In addition knowledge on how pesticides are used are needed to allocate sales data to crop types.

The overall Treatment Frequency for the whole area in rotation, can be broken down to Treatment Frequency for groups of pesticides in crop types e.g. Treatment Frequency for herbicides in winter cereal or Treatment Frequency for fungicides in potatoes.

The Treatment Frequency is regarded as an indicator for the spraying intensity as well as an overall indicator of the environmental impact of pesticides. Because Treatment Frequency is based on a standard dose that relates to the biologically active field dose, it is assumed to reflect the direct effect on target organisms as well as the indirect impact on ecosystems, which results in changes in the quantities and species found in the food chain. Projects under the Danish Pesticide Programme show a relation between pesticide use and bio-diversity.

The reduction of pesticide consumption was to be achieved partly by giving higher priority to advisory efforts, and partly by intensifying research efforts aimed at limiting pesticide consumption.

As follow-up to the Action Plan mandatory training (72 or 12 hour spraying course), requirements for the maintenance of spraying logbooks, spot inspections of spraying equipment and a pesticide tax have been introduced. The current tax level is 54 percent for insecticides and soil disinfectants and 33 percent for fungicides, growth regulators, herbicides, and repellents. A research program financed by the pesticide tax provides valuable information on pesticides occurrence and effect in the environment and effects on human health. The tax revenue is also used to finance activities related to the pesticide plans.

A status regarding the first action plan concluded in 1997 that sales of active ingredients had been reduced 40 percent whereas the Treatment Frequency was largely unchanged.

The Action Plan's goal of steering consumption towards less harmful products was made possible through the tightening and clarification of the Chemical Substances and Products Act in 1987, so that it would no longer be possible to approve substances considered especially hazardous to health or especially harmful to the environment. The Act also contained provision for the renewed assessment of all active ingredients, which had previously been classified by the Toxicological Board and which had been granted approval without time limits. The detailed plan for reassessment was laid down in the Statutory Order on chemical pesticides (Ministry of Environment Statutory Order No. 791, of 10 December 1987) and covered all pesticides, i.e., plant protection products and biocides. All of these pesticides were reassessed during the period 1988 to 1997. In the Chemical Substances and Products Act from 1987 as well as in the directive 91/414 on the placing of plant protection products on the market, it is specified that the registrations/approvals are valid for a limited time period after which the registrant has to apply for re-registration.

By the end of 1997 the Danish EPA had reassessed 209 active ingredients, of which 29 were prohibited or severely restricted. 29 active ingredients were rejected due to insufficiencies of documentation, 16 withdrawn by the applicant whereas there were no application for reassessment for 60 active ingredients.

The Bichel Committee

In May 1997 the Danish Parliament unanimously adopted a resolution in which the Parliament requests the Government to appoint a committee with independent expertise to assess, e.g., the overall consequences of phasing out the use of pesticides in the agricultural industry, and to clarify alternative means of controlling plant diseases, pests and weeds in agriculture. The assessment must clarify the consequences for manufacturing, the economy, legislation, health, employment and the environment. The results of the committee's work were intended to be included in the drafting a new pesticides action plan.

The committee (named after the chairman Bichel), which represented all relevant stakeholders concluded unanimously in 1999 that the Treatment Frequency could be reduced 30-40 percent over a 5 to 10 year period, without significant cost to growers and socio-economic consequences.

Table 1. The Bichels committee's main results

4 Scenarios	Treatment Frequency	Loss agriculture Bill. Dkr.	Loss GNP Bill. Dkr.
Optimised use	1,4 – 1,7	None	None
Limited use	0,5	1,8	3,1
No pesticides	0	3,4	7,3
Organic farming		?	11-26

The committee recommended a three-pronged strategy for reducing pesticide use, namely a general reduction of pesticide use, a reduction of exposure of biotopes, and increased organic reconstruction.

Pesticide Action Plan II

Based on the conclusions from the Bichel Committee, Pesticide Plan II was launched in 2000. The main goals were: a Treatment Frequency below 2,0 and establishment of 20.000 ha bufferzones along certain watercourses and lakes by the end of year 2000, and an increase in the acreage under organic production (230.000 ha by year 2003). Action to be taken to promote a general reduction of the Treatment Frequency index on treated land includes: Increased advice to farmers etc. on reducing their pesticide consumption, establishment of demonstration farms and info-groups, increased use of decision-support and warning systems, supplementary training of farmers and consultants, and establishment of targets for pesticide usage in the different crops. In the first action plan the reduction goals was defined as an overall goal for a 50 percent reduction of the amount of active ingredients and Treatment Frequency for herbicides, fungicides, insecticides and growth regulators, and farmers found this difficult to relate to the situation on their own farm. By breaking down the overall reduction goal for the Treatment Frequency to Treatment Frequency for groups of pesticides in crop types e.g. Treatment Frequency for herbicides in winter cereal or Treatment Frequency for fungicides in potatoes, made it possible for the farmers to judge the situation on their farm in terms of how well they were meeting the reduction goal. In the table below examples of targets for Treatment Frequency in different crops are shown.

Table 2. Target Treatment Frequency in different crops

Crop	Area 1999 1000 ha	Target Treatment Frequency			% of arable land	% of total TF
		Herbicides	Others	Total		
Winter wheat	611	1,20	1,10	2,30	27	36
Spring Barley	551	0,70	0,70	1,40	24	20
Winter barley	151	1,00	0,55	1,55	7	6
Potatoes	23	1,00	8,60	9,60	1	5
Sugar beets	63	2,40	0,65	3,05	3	5
Peas	66	1,80	0,70	2,50	3	4
Oilseed rape	105	0,80	0,75	1,55	5	4
Sum	1575				69	80
Others	663				31	20

Pesticide Action Plan II was evaluated in 2003. The evaluation showed that a great deal of knowledge had been established over the years regarding possible ways of reducing the consumption of pesticides as well as knowledge on

how to convert methods for the reduction of pesticide use into practice. Those using pesticides must now apply this knowledge.

At the end of 2002, the Treatment Frequency index had been reduced to 2,04; almost 8,000 ha of land along targeted watercourses and lakes had been laid out as spray-free buffer zones; and around 180,000 ha of acreage was under organic cultivation.

The Area Aid Scheme in favour of organic farming is a voluntary tool established in support of the nitrogen targets in the Action Plan for the Aquatic Environment II. Organic farming also helps to reduce the use of pesticides in agriculture.

Pesticide Plan 2004 –2009

The Pesticide Plan 2004- 2009 states that the use of pesticides not only influences weeds, pests, and fungal diseases, it also effects non-target flora and fauna. Moreover, pesticide residues may spread in the environment and end up in our food.

Efforts must therefore be based on an efficient approval scheme and on minimisation of the use of pesticides to a level still allowing for profitable cultivation. Among other things, such efforts must contribute to the continuation of supply of clean groundwater and clean food.

Thus, the Danish Government aims to ensure active and restrictive regulation of pesticides - also within the EU. Denmark must be among the best at reducing the consumption of pesticides, and at protecting the environment and minimising concentrations of pesticide residues in food.

The 2 first pesticide plans concentrated on agriculture, whereas all pesticide policies are gathered in Pesticide Plan 2004 – 2009. The new plan does thus include policies regarding pesticides in agriculture, horticulture, on public areas and private gardens.

In the paragraphs below the policies for the different sectors are outlined.

Reducing the use of pesticides in agriculture

The Government aims to:

- reduce the Treatment Frequency index by agriculture to 1,7 by the end of 2009.
- promote the conversion to pesticide-free cultivation.

The Bichel Committee's operating costs analyses were carried out on the basis of the economic conditions prevalent in 1995/96, as well as on the basis of contemporary knowledge about the potential within agriculture for reducing the use of pesticides. As part of the evaluation, these analyses have now been updated to 2000/2001 levels.

The Bichel Committee concluded that the Treatment Frequency index could be reduced by 30-40 per cent within 5-10 years without substantially effecting operating costs. The new analyses support the Committee's conclusion that it is possible to reduce the use of pesticides without significantly effecting operating costs.

The target of a Treatment Frequency index of 1.7 is to be achieved through:

- A targeted communication and consultancy at farm level, so that existing knowledge is disseminated to farmers.

According to assessments, there will be a further potential for reducing the use of pesticides after 2009 to an extent exceeding what analyses have showed so far. For example, the distribution of decision-support systems to more farmers can help further reduce the use of pesticides. Similarly, a great potential is believed to exist in the increased use of precision farming, in which pesticides are only applied to those areas of the plant or the field where the animals or organisms causing damage are present. Projects will be initiated in this respect under the Danish Pesticides Research Programme. Focus will be on further development of plant protection methods and strategies, including the development of new technologies. A requirement will be that the methods developed may be put to use within a foreseeable future. The target of pesticide-free cultivation will be enhanced through subsidised conversion to and operation of organic farming. Furthermore, a subsidy scheme for environmentally friendly farming will be established. Subsidies under this scheme will be granted to acreage belonging to farms not authorised for organic farming but which is cultivated in accordance with the guidelines used on organic farms.

The Kirsten Jensen Committee

As follow up to the recommendations of the Bichel Committee a comprehensive analysis of the potential for reducing the impact from pesticides in horticulture and fruit growing has been carried out (the Kirsten Jensen Committee).

The analysis shows that the use of pesticides is relatively high in horticulture and fruit growing. At the same time, products from these industries are often used as food. A reduction in the use of pesticides will therefore mean a reduction in the impact on the environment as well as in the content of pesticide residues in food.

The analysis also shows that, unlike agricultural production, it is not possible to set up specific reduction targets for horticulture and fruit growing. This is partly because of inadequate statistics on use, and partly because the crops are high-value crops, for which failed pest and weed control etc. may lead to substantial losses.

The Kirsten Jensen Committee recommended communication, consultancy, and supervision as central elements in a strategy to reduce the use of pesticides. Furthermore, the Committee recommended further research and development within prevention and control of pests, spraying techniques, weed control, and decision-support systems. This will ensure that priorities are set for efforts where the greatest possible reduction in the use and impact of pesticides can be achieved.

Reduction of the impact from pesticides in horticulture and fruit growing

The Government aims to:

- reduce, as far as possible, the environmental and health impacts from use of pesticides in horticulture and fruit growing.
- ensure the least possible concentration of pesticide residues in food production in Denmark.

In line with recommendations from the Kirsten Jensen Committee the targets are:

- targeted communication and consultancy aiming at gardeners and fruit growers with a view to reducing the use and impact of pesticides.
- research and development of methods in connection with the use of pesticides in horticulture and fruit growing, so that pesticide residues in food and the exposure of the environment to pesticides are reduced.
- increased focus on concentrations of pesticide residues in food.

Focus will be on those crops for which food safety and quality can be improved by reducing the content of pesticide residues in the products. The increased focus must be achieved through consultancy targeted at agriculture and horticulture, and in connection with the authorities' assessment of legally permitted content of pesticide residues in food.

In 2004, cultivation/growing guidelines (data sheets) will be prepared for individual field crops, such as, for example, strawberries, apples, pears, carrots, and lettuce, including specific information to growers about how much the use of pesticides can be reduced, and to what extent. Thus, the objective of the data sheets is to reduce pesticide consumption. In addition, a catalogue, targeted at growers, concerning how to reduce the consumption of pesticides in horticulture and fruit growing to the widest possible extent will be prepared in 2004. Cultivation/growing guidelines and the catalogue will be available for growers for free, and it is expected that, in this way, the tools will contribute to reducing the frequency of sprayings in this sector.

Public sector use of pesticides

In November 1998 the Minister of Environment and Energy and the National Association of Local Authorities in Denmark, the Association of County Councils in Denmark and the Municipalities of Copenhagen and Frederiksberg made an agreement to phase-out the use of plant protection products. The Parties agree to work actively towards the following objectives:

- The objectives of the Agreement are to limit the risk of polluting ground water and impoverishment of nature by phasing out the use of pesticides in public areas as soon as possible and, in principle, before 1 January 2003.
- The Agreement applies to chemical plant protection products used for the protection, control and regulation of plant growth, apart from fertilisers and micronutrients, and the control of vertebrates. The Agreement does not apply to plant protection products used in accordance with the applicable regulations on organic farming.
- The Agreement applies to areas owned, maintained and operated by local councils, county councils and the State.

The Government aims in pesticide plan 2004 – 2009 to retain public sector efforts to minimise the use of pesticides. Local and regional authorities have reduced their pesticide consumption by more than 80 per cent since 1995, whereas state authorities have reduced their consumption by 73 per cent in the same period. This positive trend must be maintained.

On the basis of a user interview survey, the parties behind the 1998 phase-out agreement are currently discussing results achieved and the need for possible adjustments to the agreement.

Private use of pesticides

The Government also wants to reduce the private consumption of pesticides and prevent incorrect use and dosage of pesticides.

Thus, the Government will:

- initiate an information campaign aiming at private garden owners.
- strive to reach an agreement with industry on "ready-to-use" pesticides.

In connection with the information campaign, the Ministry of the Environment will concentrate on incorrect dosage and handling of spraying agents as well as on alternatives to pesticides.

The Government will work on entering into agreement and cofinancing with relevant organisations about information, including establishing a Hot Line where garden owners will be able to receive guidance and tips on how to deal with weed problems, fungal diseases etc. with no or minimal use of pesticides.

A draft agreement with the Danish Crop Protection Association about sole marketing of "ready-to-use" control agents for private garden use is currently being negotiated.

Evaluation

In the first half of 2010, an evaluation of target performance and measures applied will be carried out.

An evaluation of Treatment Frequency will be carried out each year in order to monitor target performance trends, however, considering annual variations.

In connection with calculations of the Treatment Frequency for 2007 a special status report about achievement of the overall strategy will be prepared. Provided the assumptions of the Bichel Committee concerning agriculture's production terms still apply, and provided it is technologically possible, the Government will discuss a possible reduction in the Treatment Frequency index by 0.1.

Conclusions

- Public concerns regarding pesticides especially with respect to pollution of groundwater and thus drinking water, has been a major driving force in Danish pesticide policies
- Fixed goals and timeframes are necessary in measuring progress and keeping up the pressure
- A pesticide tax is helpful in creating means to finance activities related to pesticide plans (it also helps to reduce the pesticide consumption)
- The Bichel committee's economic analysis showing that pesticide consumption can be reduced with little or no economic consequences to growers created a consensus on all levels, that pesticide (over)use must be reduced.
- Involvement of all stakeholders in the analysis was crucial for acceptance of the analysis' premises and results.

- Translating the overall national reduction goals into target related to crops and thus farm level has helped farmers realising if an effort to reduce the use of pesticide is needed on their part and has been an important tool in counselling
- Focused on farm counselling regarding reduction of the use of pesticides has helped farmers reducing the Treatment Frequency