# PESTICIDE USE REDUCTION IS WORKING:

# An assessment of national reduction strategies in Denmark, Sweden, the Netherlands and Norway.

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***PAN Europe***

***Pesticides Action Network Europe***

This report was prepared by Catherine Wattiez and Stephanie Williamson, PAN Europe.

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## 1. Introduction

Some pioneer Member States began to implement pesticides use reduction plans in the late 1980s or early 1990s. The same is valid for Norway. The key concerns[1] of these Member States for implementing use reduction were: contamination of water resources used for human consumption; adverse effects on ecology; risks to consumers of food with residues; effects of exposure to residues in water, soil and air; and contamination of surface water or the marine environment.

In addition to increased scientific knowledge about toxicological and ecotoxicological properties of pesticides, new research findings are leading to conceptual shifts[2] in the fundamentals toxicology. These changes in our scientific understanding highlight the importance of urgent action to implement precautionary[3] pesticides dependency reduction.. The traditional way of controlling pesticide problems has been to tackle each substance individually, but there is ample evidence to suggest that this approach has not been adequate. As stated in the Commission Communication on the Sixth Environmental Action Programme , « *there is sufficient evidence to suggest that problems associated with contamination of the environment and food by pesticides are serious and growing »* We are just beginning to understand the health effects of exposure to small quantities of pesticides , often over a period of time, as well as the way different contaminants interact in our bodies *but* « *a clear overall picture of health impacts resulting from complex, real life exposure is missing*[4] ».As stated in a recent WHO/EEA report[5], the foetus, infants and children are more vulnerable, both quantitatively and qualitatively, to pesticides than adults and are also more exposed. Current core tests and risk assessment methodologies do not fully ensure pesticide safety for this vulnerable group. Possible health effects include immunological effects, endocrine disrupting effects , neurotoxic disorders and cancer. For all these reasons, there is an urgent need to act to protect particularly vulnerable groups in society.

Moreover, an increasing number of studies show that pesticides negatively affect biodiversity, not only in the place where they are applied but also in other ecosystems. These complex indirect effects on ecosystems are not currently addressed in pesticides risk assessments or reflected in pesticides risk indicators**.**Therefore, as a matter of precaution, the reduction of exposure to all pesticides should be a sound political choice.

The European Commission is presently developing a Thematic Strategy on the sustainable use of pesticides and will propose the establishment of *'national plans to reduce hazards, risks*

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[1] European Commission, Netherlands Ministry of Housing, Spatial Planning and the Environment, Netherlands Ministry of Agriculture, Nature Management and Fisheries, 1997, *« Possibilities for future EU environmental policy on plant protection products »* , report prepared by Oppenheimer, Wolff & Donelly

[2] John Peterson Myers , *« From Silent Spring to Scientific Revolution »* , pt 1 and 2 , Rachel's Environment & Health Newsletter no 757 and 758 , November 28 , 2002 and December 12, 2002
http://144.16.65.194/hpg/envis/doc1999ahtml/miscrew230131.html
http://www.cedar.at/mailarchives/infoterra/2003/msg01573.html

[3] according to the precautionary principle, at the « effect » level, precursor of « harm » rather than on a proven « harm » when it is too late and very costly.

[4] Commission Communication « A European Environment and Health Strategy », 11 June 2003

[5] World Health Organisation (WHO) Regional Office for Europe and European Environment Agency (EEA) , 2002, *« Children's Health and Environment : A Review of Evidence »*, Environmental issue report n ° 29

*and dependance on chemical pesticides'*[6] . In this context, PAN Europe provides this summary assessment of strategies for pesticides use and/or risk reduction implemented by pioneer Member States and by Norway. It describes the measures involved, their effectiveness, the main factors of success or of difficulties encountered, and advantages and limitations of the target indicators used. We hope that this information will be useful for Member States officials as well as for other stakeholders for discussion on national level reduction plans envisaged in the Thematic Strategy.

[6] Commission Communication *« Towards a Thematic Strategy on the Sustainable Use of Pesticides »*, 4 July 2002

## 2. Pesticides use and risk reduction strategies in four European countries implementing a national reduction programme

NB : Dates given correspond to when measures started. Measures can be subsequently reinforced or abandoned. V indicates that the measure exists but on a voluntary basis only.

| INITIATIVES | Denmark DK | Sweden SE | Netherlands NL | Norway NO |
|---|---|---|---|---|
| Re-registration programme (additional to EU 91/414) | 1987[7] | 1990 | 1995-2001 | 1963 |
| Regular review of registrations | 2002[8] | 1990 | | Every 5 years |
| Phase out of harmful active substances | 1987[9] | 1980 | Up to 2001 | yes[10] |
| Encouraging registration of plant protection products of natural origin | | | Project in the new plan | |
| Rejection of application of plant protection products whose use are likely to increase dependence on pesticides and counteract national reduction policy | | 1987 | | yes |
| National study to determine consequences as well as costs (including internal ) and benefits of various pesticides use reduction scenarios | 1999[11] | 1996 | | |
| Broad stakeholder participation in national reduction programme development | 1998 | 1991 | 2003 | Only farmers groups |
| National reduction programme | 1987 | 1987 | 1990/1991 | 1985 |
| Concrete reduction targets and timetables | 1987 | 1987 | 1990/1991 | 1998 |
| Indicator(s) used to measure progress towards target(s) | 1987 | 1996 | 1990/1991 | 1998 |
| Goals for pesticide use reduction in public area (non-agricultural use) | 1998[12] | | | [13] |
| Other specific reduction goals (groundwater, surface water, residues on food) | | 1996[14] | 1990/1991[15] | 1998[16] |

[7] Re-registration was decided in 1987.
[8] A registration can also be modified or withdrawn before the approval period has ended , if there is a reasonable suspicion of impact on human and animal health.
[9] Harmful pesticides have been banned since 1994.
[10] Using the substitution principle.
[11] Bichel study.
[12] In 1998 an agreement was made between the environment minister, counties and municipalities to phase out the use of pesticides by 2003. Municipalities have reduced pesticide use by 83% since 1995, counties by 80% government by 73% in the same period. Ninety two out of 213 municipalities didn't use pesticides at all in 2002.
[13] It is mandatory to put signs in treated public areas to inform the public.
[14] No residues of unregistered pesticides or above the MRLs in domestically grown fruits and vegetables, concentration of individual pesticides should not exceed 0,1 µg/l and combined concentration 0,5µg/l in groundwater, no detectable residues in surface or groundwater intended for human consumption.

| | | | | |
|---|---|---|---|---|
| Mandatory education/certification of sprayers (farmers and professional pest control operators) | 1993 | 1987 | 1996 | 1997 |
| Mandatory education/certification of pesticide retailers, distributors | | | 2006 | 1997 |
| Mandatory pesticide use training/accreditation for crop protection advisers and agricultural extension officials | 2002 V | | 2004 V[17] | |
| Extension services /programmes promoting need-based models (decision support, warning systems) | Since 1980s | 1985 | | yes[18] |
| Requirement to spray only if observed need | | V | 2004 V | yes[19] |
| Requirement to justify each application | | | | |
| Independent demonstration programmes/farms showing how to reduce pesticide dependency by use of low input and non-chemical pest control methods and systems | 1987[20] | 1986 | 1980[21] | |
| Dose rate reduction programme | 2000 | 1986 | | |
| Permits for PPP use | | 1985 | 1993[22] | yes |
| Mandatory approval of types of spray equipment | | | | |
| Mandatory periodic inspection of spray equipment | 1994[23] | | 1996 | 2001 |
| Mandatory reporting on production, import, export, sales and distribution of pesticides | before 1987 | | Sales (1993) Other data V (2004) | Yes, quarterly |
| Mandatory farm level record keeping of PPP use | 1994 | 1997 | 2002[24] | 1999 |
| Regular surveys to determine pesticides use patterns | 1987 (each year) | 1988 | 1990[25] | 2001[26] |
| Mandatory monitoring of pesticide poisoning and pollution incidence | For physicians | 1990 | | Not systematic |

[15] In the plan 1990/1991-2000, targets were set for reduction of emissions to air, groudwater/soil and surface water.
[16] "Pesticides in groundwater should never occur, and shall not exceed drinking water approved maximum limits". "Occurrence of pesticides in surface water shall be reduced as far as possible, and shall not exceed levels that may be harmful to the environment". "Occurrence of pesticide residues in food and drinking water shall be reduced as much as possible, and never exceed approved maximum limits".
[17] In the Netherlands most advisers to farmers belong to the pesticides industry (about 85 pesticides producers) . Nephyto, the pesticides industry group will be required to pay more attention to the « Product stewardship », a code of conduct of the pesticide industry , and to publish how they comply with it in their annual reports.
[18] Warning systems made available for agricultural advisers and farmers as on-line web inter active service. A compulsory programme for seed infection analyses pointing out the need for seed dressing treatment, was introduced in 1990. It resulted in a reduction of the use of seed dressing treatment bymore than 30 %
[19] For some plant protection products only.
[20] Now, 17 study farms have received intensive advice in pesticide use reduction strategies and serve as demonstration farms. Manyfield tests for pesticide use reduction are also organised by the farmer organisations.
[21] At research level, but extension services are lacking.
[22] Decree on Regulation of soil sterilants : now frequency is limited to one sterilisation every 5 years. In the policy 2004-2010, the project is to consider possibilities for use permits in the product authorisations conditions.
[23] 1% of the spraying equipment is controlled each year.
[24] Nearly 50% of farmers do not currently keep records.
[25] Done every two years.
[26] Systematic in 2001 and 2003. Will probably continue every other year.

| | | | | |
|---|---|---|---|---|
| Controls over PPP use in drinking water protection zones | | 1997 | [27] | |
| Periodic inspections of pesticide dealers and operators | before 1987 | | | yes |
| Groundwater monitoring program | 1995[28] | 1990 | V[29] | Not systematic |
| Biomonitoring programme of species exposed to pesticides in ecosystems | | V | | |
| Biomonitoring programme of pesticides in humans | | | | |
| Standards for max. allowable concentrations of PPPs in environment | | 2003 | yes[30] | yes[31] |
| « Green labelling » scheme for agricultural products with reduced pesticide use | | V | yes[32] | |
| Definition of pesticide vulnerable zones | In progress[33] | | | |
| Controls including bans on application of pesticide in pesticide vulnerable zones | 1990s V | 1997 | | |
| Control including bans on applications of pesticides in areas where high risk of exposure to persons | 1990th V | 1997 | | yes[34] |
| Buffer zones along targeted watercourses and lakes | 2000[35] | 1997 | yes[36] | yes[37] |
| Introduction of targets for pesticides usage in the different crops as a control instrument at farm level | 2000 | | | |
| Definition of integrated crop management for each crop and crop rotation system | | V | [38] | 2000-2001 |
| Targets and timetables for ICM/IF development | | | From 2004[39] | |
| Targets and timetables for organic farming development | | 2000 | 2001 | yes |
| Economic support for spray free zones | 2000 | 1998 | | |
| Economic support to convert to organic farming | 1987 | 1998 | From1999 up to 2002 | yes |
| Economic support to convert to integrated crop | | 1998 | In project in the | |

[27] Done only by water companies.
[28] Each year.
[29] Done by provinces.
[30] In surface water ( water policy), soils.
[31] Groundwater/drinking water : 0,1 µg/l; other: shall not exceed levels that can be harmful to the environment.
[32] But not part of the reduction plan
[33] A study has been made to define pesticide vulnerable zones in sandy soils, and it should be finished soon. A similar study for clay soils will be made in the next years.
[34] The most toxic pesticides are not allowed in public areas.
[35] In 2002 there were 8,000 ha spray-free zones along watercourses and lakes, and the goal for 2009 is 25,000 ha.
[36] Regulation prescribes buffer zones along all watercourses . Buffer zone size is function of the crop and of the spraying technique.
[37] Buffer zones are specified on pesticides labels. Not site specific.
[38] Not yet defined per crop or crop rotation system . ICM definition only in very general terms in the regulation to be possibly modified by 2005/2007. ICM plan must be drawn up at farm level.
[39] From 2004, only ICM will be used in the Netherlands. Agricultural production has to be based on the **« no, unless… principle »**. This means that no pesticides shall be used in the growing of crops or in other pest control applications, unless it is determined that no other method , practice or system of control is available to prevent unreasonable pest damage.

| | | | | |
|---|---|---|---|---|
| management / integrated farming | | | new policy | |
| Active research on integrated crop management and integrated farming | | 1990 | 1984 | yes |
| Active research on organic farming | 1996 | 1995 | 1998 | yes |
| Strict limits on aerial spraying | | | Since long time | yes |
| Ban on aerial spraying | 1990s | 1978 | | |
| Systems for safe collection and disposal of used pesticides packaging and obsolete pesticides | Up to the retailers | 2003 | Since about 1993[40] | yes |
| Restrictions for use in homes and private garden | in progress[41] | 1984 | | yes |
| Information campaign for use reduction/alternatives in home & garden | in progress for garden | V | | [42] |
| Programme for reduction in non-agricultural use, i.e. amenity, transport, public sector buildings, etc | | | | |
| Sales tax on PPP | 1992[43] | 1985 | | yes[44] |
| Levy on PPP | | 1986 | | yes |
| Financial instruments to support consumers of sustainable food products | | | In project in the new policy | |
| Transparency of the food production chain (conditions set by retailers and food providers for ICM) | | | From 2004 V[45] | |
| Publication by authorities of residues results in supermarkets and other food providers products | | | From 2004 V[46] | |

[40] Organised by the government.
[41] The goal in the new plan (2004-2009) is, that only « ready for use » pesticides may be sold for private gardens.
[42] No governmental campaign but campaigns by NGOs.
[43] Presently the tax is 54% of retail price (VAT excluded) for insecticides and 33% for herbicides, growth regulators and fungicides. 75 % of taxrevenue goes back to farmers in lower land taxes.
[44] The tax is differentiated according to the pesticide health and environmental properties and based on standard area dose.
[45] May be mandatory later.
[46] May be mandatory later

## 3. Pesticide reduction achievements in national reduction programmes

Note : TF = Treatment Frequency (for explanation see section 5.)

| COUNTRY | PERIOD | REDUCTION TARGET | REDUCTIONS ACHIEVED |
|---|---|---|---|
| **DK** | 1987-1997 | 50% use/volume ai<br>50% TF (to 1.34)<br>(baseline: 1981-1985) | 47 % use/volume ai<br>8% TF (to 2.45) |
| | 2000-2002 | | |
| | 2004-2009 | TF less than 2.0<br><br>TF = 1,7 | TF 2,04<br>(59% use/volume ai) |
| **SE** | 1986-1990 | 50 % use/volume ai<br>(baseline: 1981-1985) | 49 % use/volume ai |
| | 1991-1996 | 75 % use/volume ai | 64 % use/volume ai |
| | 1997-2001 | No use target, but further reduction in risks expressed by environmental and human health indicators | 63 % for environmental risk indicator (2000)<br><br>77 % for human health risk indicator (2000). |
| **NL** | 1990/91- 2000 | 50% use/volume ai<br>(baseline :1984-1988) | 43% use/volume ai |
| | 2004-2010 | 75% reduction in risks by 2005 and 95% by 2010, as expressed by an environmental load indicator<br>(baseline : 1998) | |
| **NO** | 1985-1996 | Reduce use as far as secure | 54 % reduction in use |
| | 1998-2002 | 25 % risk reduction | Norwegian risk indicators showed a 33 and 37 % reduction in health and environmental risk, respectively |
| | 2004-2008<br>in preparation | | |

## 4. Factors contributing to success or difficulties in implementing national use/risk reduction programmes

Ranking :

- 1= small level of influence
- 2= some influence
- 3= definite influence
- 4= very strong influence

| Factors contributing to success | DK | SE | NL | NO |
|---|---|---|---|---|
| Setting of quantifiable targets | 4 | 3 | 4 | 3 |
| High level awareness among ministries on the need for use/risk reduction | 4 | 4 | 4 | 4 |
| Active stakeholder participation in national plan development | 3 | 4 | 0 | 4 |
| Consumer demands for food with minimal residue levels | 2 | 2 | 0 | 4 |
| Good farmers participation | 3 | 4 | 0 | 3 |
| Good cooperation between ministries of agriculture and environment | 1 | 4 | 0 | 3 |
| Mandatory requirements | 4 | 3 | 2[47] | 4[48] |
| Extensive agricultural research in pesticide-free or low input production systems | 2 | 3 | 4 | 2 |
| Extensive advisory service to reach farmers | 4 | 4 | 0 | 4 |

[47] Decree on soil disinfectants was a key factor for use/volume reduction of ai
[48] Certification of users, farm level record keeping, spray equipment inspection

| | | | | |
|---|---|---|---|---|
| Practical advice on how to reduce pesticide dependency on a crop-specific basis | 4 | 4 | 0 | 2 |
| Strict pesticides registration criteria | 4[49] | 4 | 0 | 4 |
| Taxation on Plant Protection Products | 3 | 1 | 0 | 3 |
| **Factors contributing to implementation difficulties** | **DK** | **SW** | **NL** | **NO** |
| Lack of resources for agricultural research and extension | 0 | 3 | 0 | 2 |
| Lack of independent information provision to farmers | 0 | 3 | 4 | 2 |
| Adverse economic results associated with reduced use of plant protection products | 0 | 3 | 0 | 3 |
| Lack of uptake /interest/ cooperation among farming community | 3 | 3 | 4 | 2 |
| Lack of cooperation among ministries and stakeholders | 0 | 1 | 4 | 2 |
| Barriers for pesticide dependency reduction in Directive 91/414/EEC | 1[50] | 0[51] | 0 | 0 |
| Lack of mandatory requirements | 0 | 1 | 4 | 1 |
| Lack of high-level political committment to pesticide reduction | 0 | 1 | 0 | 3 |

[49] To protect groundwater, human and animal health.
[50] Lack of the substitution principle to ban pesticides when non-chemical alternatives do exist.
[51] But highly relevant for the future.

| | | | | |
|---|---|---|---|---|
| Lack of financial incentives to farmers and consumers | 0 | 0 | 4 | 0 |
| Lack of tranparency about residue results in supermarket and other food providers products made by authorities | 0 | 0 | 4 | 0 |

# 5. Indicators used to measure reduction targets

## 5.1 USE INDICATORS

### 5.1.1. Volume

Description: percentage of use reduction, expressed as tonnes of active ingredients

Comments:
Those Member States with pesticide use reduction programmes already in place have found pesticide use/volume reduction targets to be important tools for focusing policies and for selecting implementing measures. Pesticide volume reduction targets, however, have been widely criticised as an insufficient indicator of use reduction. This parameter can be influenced by a decrease in the farmed area, change in cropping patterns, yearly variation in pest problems, or changes in formulations. In most countries with pesticide reduction programmes, the reduction in the volume of pesticides used was greatly influenced by the rising use of low dose pesticides. Moreover, a simple reduction in volume does not necessarily equate to a reduction in risk because the lower dose chemicals are more biologically active and may pose an equal, or even greater, risk to the environment, to biodiversity and to health. Equally, growers can also switch to high volume products (e.g. used by organic growers) with a reduction of risk as a consequence. However, when used in conjunction with other indicators and targets, pesticide volume reduction targets have been useful.

### 5. 1.2. Treatment Frequency index

This indicator is the only use indicator that integrates effects of new « low dose » pesticides. It was developed by Denmark in the mid-eighties as it was realised that the increasing use of new « low dose » pesticides was not reflected in the sold amount of active ingredients (a.i) . It was thus observed that drop in sales of a.i. can take place at the same time as the number of applications – and the pesticide load on the environment – increases.

The treatment frequency index (TF) is designed to reduce dependency on pesticides. It enables tracking of trends in pesticide use intensity.

Description:
The TF is the calculated number of pesticides applications in agriculture per year, provided a fixed standard dose is used.

| Data needed for its calculation: | Mode of calculation : |
|---|---|
| • annual sales of each product or a .i.<br>• surface area for each crop/crop type in cultivation<br>• standard dose of product or a .i. for each crop/crop type<br>• how much of each product or a.i . is used for a particular crop/crop type in order to allocate sales data to crop/crop types | • the volume of each product or a.i. sold *divided* by the recommended dose per crop/crop type *gives* the theoretical area treated if there was 1 product or a.i. application at the full recommended dose<br>• the theoretical area treated *divided* by the area under cultivation by a particular crop/crop type *gives* the treatment frequency index<br>• the results are *summed* over all products or a.i. and all crops<br>• it can be calculated at various levels :<br>- per pesticide and per crop<br>- per pesticide for all crops<br>- per category of pesticides per crop<br>- per category of pesticides for all crops<br>- for all pesticides per crop<br>- for all pesticides for the total area in cultivation<br>- at farm level to help farmers to monitor and reduce their own use |

Comments:

The TF is an indicator for environmental impact

- The TF can be considered as good indicator of environmental load as it is assumed that all pesticides - even low dose « highly specific » pesticides- may affect non-target organisms , individually or in combination, at short or at long term, lethally or sublethally, directly or indirectly (on biodiversity).
- Since it is based on the active field dose, it indicates direct effect on target organism as well as direct and indirect effect on non target organisms resulting from changes in the quantities and species found in the food chain.
- Danish studies have shown variations in TF correlated with variations in biodiversity of bird populations, fauna and flora of agricultural zones, aquatic ecosystems (see www.mst.dk ).

The TF as a policy tool

- The TF reflects the mean spraying intensity , the dependency on pesticides and the efficiency of use reduction measures.
- A Danish study (the Bichel report) showed that pesticide us (as measured by TF) could be reduced by 40% from 1997 levels in 5-10 years without serious economic loss to farmers and society.
- TF is easy to calculate and therefore easy to understand (transparent)
- Target TF for herbicides, fungicides, insecticides and growth regulators has been established for all main crops. Extension officers and farmers work out how the target TF can be achieved on individual farms

- The TF makes it possible to establish tangible reduction goals at national level which can be understood and implemented at farm level.

- Changes in inherent properties like toxicity to fish, birds, mammals, … which may not be directly reflected in the TF can be tracked by other types of indicator such as risk indicators .

## 5. 2. Risk indicators

Pesticide risk indicators, developed for many different purposes and sometimes very complex to calculate, can bring valuable information but their meaning can be limited, mostly as far as chronic (eco) toxicity and impacts on biodiversity[52] are concerned .They can, however, be used to get an idea of changes in risks over time but do not provide an accurate estimation of pesticides impacts on health, environment and do not address impacts on biodiversity.

### 5.2.1. Sweden:

Description :

| **Present PRI** | **Proposed new PRI** |
|---|---|
| Based on (for each active substance):<br>• sold quantity<br>• current hazard classification (including also persistence, bioaccumulation and mobility properties) | Based on (for each active substance):<br>• the theoretically maximum number of hectare doses[53]<br>• current hazard classification (including also persistence, bioaccumulation and mobility properties)<br>• exposure related factors such as formulation type, presence in water, application method and frequency |
| Two types of indicators are used; one related to environmental risks and one to human health risks. | Two types of indicators are proposed; one related to environmental risks and one to human health risks. |
| Has been in use since 1997 | Will be used from 2003 and onwards. |

Comments :
A new set of indicators to be used at farmer level will also be developed. The aim is to use a more realistic approach by defining local exposure conditions. Another important aspect is that by using these tools, farmers can check their individual progress in relation to risk reduction. In the long term, the intention is to aggregate results from the farmer level indicators so they also can be used to express risk trends at the national level.

[52] Because of trophic interactions, effects of pesticides usually extend beyond populations to ecosytems.
[53] Hectare dose is a measure for the reliance on chemical pesticides in agriculture. It is defined as the quantity of active substances used per hectare. It reflects the magnitude or intensity of spraying. It is calculated by dividing the sold amount of each active substance with the recommended dose per hectare.

## 5.2.2. The Netherlands

Description :
The indicator calculates emissions into several environmental compartments (surface water, ground water, soil, non-agricultural soil and atmosphere) from agriculture, horticulture and glasshouses. Potential ecotoxicological consequences of these emissions are judged by comparing predicted environmental concentrations (PEC) and acute and chronic toxicity data for aquatic (fish, daphnia, algae), soil (earthworms) and terrestrial organisms (birds). The norm of 0,1 µg/l is used as a reference for groundwater.

| **Present environmental PRI[54]** | **Proposed new environmental PRI** |
|---|---|
| Based on (for each active substance):<br>• yearly sales figures<br>• agricultural knowledge about the use of pesticides in crops:<br>- crop area and growth stage<br>- dosage, frequency of application<br>- application technique<br>- use of buffer zones<br>• emission characteristics from various emission routes:<br>- physico-chemical properties of each pesticide<br>- average geographical[55] characteristics of the Netherlands as a whole | Only acute toxic effects are presently considered.<br>A method for the evaluation of chronic effects, taking into account transformation of compounds and the time lag between application and emission occurring for some emission routes, will be developed in the near future. |
| Has been used since 1998 | Will be used is future when fully developed |

Comments :
This tool is also able to give insight into contribution of individual crops, of individual active ingredient and to distinguish between times of application.

## 5. 2.3. Norway

Separate pesticide risk indicators for health and environment were developed by the Norwegian Agricultural Inspection Service,in collaboration with the Ministry of Environment, as part of the new plan of action 1998-2002 for reducing risks associated with the use of pesticides. The plan aimed to reduce the risk of damage to health and the environment by

[54] PRI = Pesticide Risk Indicator
[55] Geographical characteristics are for example soil properties, temperatures, water/soil ratios. In order to refine the approach, spatial information has been incorporated in calculating this indicator. The Netherlands has therefore been divided into aproximately 136 000 geographical units (cells) of 500 X 500 m2, each one having its own geographical characteristics.

25%, measured by the best available methods, which take account of pesticide inherent properties and exposure loading, among other things.

Description :

| **Present environmental risk index (E)** | **Present health risk indicators** |
|---|---|
| E includes summing of scores for each active ingredient in each individual product.<br>Scores calculated for:<br>• undesirable terrestrial effects ( earthworms, birds)<br>• undesirable aquatic effects( algae, Daphnia, fish)<br>• leaching potential<br>• persistence<br>• bio-accumulation<br><br>Persistence is given double weighting to take account of any increased risk of chronic effects as the system otherwise only takes account of acute effects. Scores based partly on EU FOCUS and EPPO toxicity exposure ratios (TER). | Based on inherent properties and a simplifed estimation of exposure, according to formulation type and method of distribution (taken from label information):<br><br>Health Risk Index according to product label risk phrases for acute and chronic toxicity in the categories Very Toxic, Toxic/Corrosive, Harmful, Irritant, by summing points for all label phrases<br><br>Product Risk Index:<br>exposure factors for mixing/loading x exposure factor for application method x Health Risk Index<br><br>Chronic risk considered more serious than acute effects and weighted more heavily |
| In use since 1999 | In use since 1999 |

Comments :
Modification of the environmental risk index formula is done for seed treatment agents and greenhouse pesticides, where risks for certain exposure are seen as insignificant, and for microbiological agents. The environmental risk indicator can be used to monitor changes of time,by multiplying individual E for each active ingredient by the area in 0.1ha on which the product is applied in each year, based on standardised area dose with the quantity sold. Trends over time for health risk can be calculated in the same way with annual consumption of product volume.

The health risk data is taken from readily available label information and sales to give a crude estimation of health risk but lacks reliable correlation with the number of users exposed over Acceptable Operator Exposure Level. The Working Group also assessed risks to health and environment at each link of the pesticide life cycle, from import to usage, treatment of residues and packaging.This can often be best easured by good questionnaire research on attitude and practice.

# 6. **Conclusions**

Precautionary pesticides use reduction action is necessary to protect human health, environment and biodiversity. The need for action was well recognised by pioneer Member States and Norway , since the late 1980s.

Pesticides reduction plans in pioneer Member States and in Norway have proved they can work and further use/risk reductions actions are now being implemented in subsequent pesticides plans.

Use and risk reduction strategies are very diverse. Existing regulations adopted outside the strict context of the pesticide action plan can also be helpful in reinforcing new integrated planned measures.

Main factors of success include:

- ✓ the high level of awareness among ministries on the need for use/risk reduction
- ✓ setting of quantifiable targets and mandatory requirements
- ✓ active farmers' participation
- ✓ stakeholder participation in the plan development
- ✓ existence of independent extension advisory service that can also advise on how to reduce pesticide dependency on a crop specific basis.

Main factors contributing to implementation difficulties include:

- lack of uptake/interest/ cooperation among farming community
- lack of mandatory requirements
- lack of independent information provision to farmers
- lack of cooperation between ministries and stakeholders
- lack of financial incentives to farmers and consumers.

Although pesticide risk target indicators can bring valuable information, we do need to recognise their limitations. They do not provide an accurate estimation of pesticides impacts on health and/or environment, including its biodiversity dimension. The Treatment Frequency index is preferable because it is also correlated with variations of biodiversity. It is designed to reduce dependency on pesticides and hence exposure to all pesticides, for the benefit of health, biodiversity and environmental contamination.

We hope that this summary of national experiences in reducing pesticide use/risk will be of interest for all concerned stakeholders.

# 7. Bibliography


WWF International , 1992 Research Report « Pesticide Reduction in Denmark, the Netherlands, and Sweden », ISBN 2-88085-102-5.

WWF International, 1993 Research Report « The Pesticide Reduction Programme in Denmark, ISBN 2-88085-145-9.

Umweltstiftung Deutschland, 1996, « Pestizidreduktion in Dänemark, den Niederlanden und Schweden

European Commission, Netherlands Ministry of Housing, Spatial Planning and the Environment, Netherlands Ministry of Agriculture, Nature Management and Fisheries, 1997, « Possibilities for Future E.U. Environmental Policy on Plant Protection Products », Synthesis Report, prepared by Oppenheimer, Wolff and Donnelly

Pesticide Action plan II and Background report for Pesticide Action Plan II, March 2000 , Danish Ministry of Environment and Energy Ministry of Food, Agriculture and Fisheries ( www.mst.dk )

The Bichel Committee, Report from the Main Committee, 1999 (www.mst.dk )

Nordisk samarbeid for redusert bruk av pesticider , 2003, October Nordic Action Plan conference document

Meriel Watts, Robert Mac Farlane, 1997, « Reducing Reliance – A Review of Pesticide Reduction Initiatives », Pesticide Action Network Asia and the pacific, Penang Malaysia, ISBN : 983-9381-07-5

Swedish Board of Agriculture, 1999, Programme to reduce the risks connected with the use of pesticides in Sweden, ISSN 1102- 8025 ( www.sjv.se )

Pesticide Action Plan Norway : www.landbrukstilsynet.no

Kare Arsvoll, 2001, Norwegian Ministry of Agriculture « Plant Protection Products (PPP) Use and Risk Reduction Programmes in Norway », proceedings of PAN Europe Bredbeck Germany conference 7/9-11-2001 , « Time for a Change » , ISBN 3-9806254-5-1, PAN Europe, Hamburg.

Terje Royneberg, 2000, Norwegian Ministry of Agriculture, « Norway Launches Ambitious Risk Reduction Plan », proceedings of PAN Europe conference Rhöndorf , PAN Europe, Hamburg.

Pesticide risk indicators for health and environment- Norway
- *http://www.landbrukstilsynet.no/vedlegg/Norwegian_pesticide_risk_indicators.doc*

Germany 6/8-10-2000, « Pesticide Reduction – Opportunities for Action », ISBN : 3-9806254-2-7 , PAN Germany, Hamburg

Tweede kamer der Staten-Generaal, vergaaderjaar 1990-1991, Meerjarenpla-Gewasberscherming, ISSN 0921-7371

Hans Muilerman and Arno Steekelenburg, Zuid-Hollandse Milieufederatie 1996, « De buik vol van Gif – Tussentijdse Evaluatie van het MeerjarenPlan –Gewasbescherming (MJP-G) door samenwerkende Milieu-Organisaties»
Ministerie van Landbouw, Natuurbeheer en Visserij, 2000. Voortgangsrapportage 1999. Bestuurovereenkomst Uitvoering Meerjarenplan Gewasbescherming

Update on new plan for Denmark : Hans Nielsen , Ecocouncil , DK

Update on new plan for the Netherlands : Hans Muilerman, Stichting Natuur en Milieu, NL

Update for Sweden : Swedish National Chemicals Inspectorate, KEMI

Update for Norway : Pesticides section, Norwegian Agricultural Inspection Service Norwegian Ministry of Agriculture.