

SECTION 3

Additional EU Policy Instruments for Plant Protection Products

(Sub-Report prepared by Wageningen Agricultural University)

The main focus of this sub-Report was to identify, describe and analyse a set of additional policy instruments with the objective of a reduction in use and, where possible, risk of PPPs.

Each additional policy has several variants, which led to an overview of 52 partly overlapping instruments. In total the 22 instruments elaborated in detail were those which most adequately met the criteria of effectiveness, efficiency, acceptability, enforceability, homogeneity and which avoided large disturbances of property rights and income, and as defined in the author's Terms of Reference.

3.1 INTRODUCTION

3.1.1 Plant Protection Product-use in EU Agriculture

It is extremely difficult to characterise the situation of PPP-use in the European Union and the Member States by means of a single overview table. It is accepted, for example, that regional and crop differences may largely cancel each other out in the larger EU Member States. Moreover, data for one year will depend also on random aspects such as the weather, disease patterns and PPP and crop prices. It has nevertheless been assumed that use of the summary Table 3.1 overleaf, will at least allow the current situation to be placed in some kind of general perspective.

Two different parameters should be noted: (1) the intensity of PPP-use (measured by means of kilogram active ingredient per hectare), and (2) the efficiency of PPP-use (mostly measured by means of kilogram of active ingredient per unit of crop production). The two characteristics are shown in the Table below. There is a large difference between the two measures between Member States of the EU. By way of example, the Netherlands has the highest PPP-use per hectare, but is found at the lower end per unit of crop production. Similarly, Portugal has the highest use per unit of crop production, but roughly 'average' sales per hectare.

Several disturbing elements influence the 'overall picture' provided in Table 1, identified in the sub-Report as:

- the share of PPPs used at grassland (which pushes up the data of *e.g.* Ireland and Luxembourg);
- the high price level of agricultural products in Finland, and to a lesser extent in Austria (which leads to a high efficiency level). In addition, most attention is paid to emissions of PPPs to the environment and health risk elements (sometimes in comparison with the benefits of PPP-use).

Table 1 **Overview of PPP-use characteristics in the Member States of the European Union in 1993**

Country	Arable and hort. area incl. set-aside (1000 ha)	Crop value (million ECU)	Sales of PPPs (tons AI)	Sales of PPPs (kg AI) per ha	Sales of PPPs (kg AI) per 1000 ECU crop production
Austria	918	1481	3669	4.0	2.48
Belgium	747	2600	10282	13.8	3.95
Denmark	2460	1921	4277	1.7	2.23
Finland	999	1516	1150	1.2	0.78
France	15865	22061	88492	5.6	4.01
Germany	11359	12283	29350	2.6	2.39
Greece	2111	5914	9260	4.4	1.57
Ireland	155	532	2523	16.3	4.74
Italy	8464	20969	78394	9.3	3.74
Luxembourg	58	38	253	4.4	6.72
Netherlands	839	7224	11284	13.5	1.56
Portugal	1578	1362	9426	6.0	6.92
Spain	12888	13099	29501	2.3	2.25
Sweden	1394	739	1621	1.2	2.19
United Kingdom	5186	6722	33240	6.4	4.95

3.1.2 Categorisation of Instruments

Instruments are grouped in the sub-Report according to policy characteristics:

1. mandatory regulation (currently the most important set of instruments used by Member States in the area of PPP use reduction);
2. information, persuasion and awareness objectives (achieved on a voluntary basis, acting directly on agents in the PPP chain);
3. covenants/arrangements between industry/government;
4. technological and institutional change (working in a more indirect way with the intention that a behavioural change will result);
5. economic instruments (where government is the main initiator);
6. private law instruments (are rather general and can be applied in nearly every situation. Only a single private law instrument was felt to contribute significantly to the debate on potential additional PPP policy instruments).

3.2

SELECTION OF RISK MANAGEMENT ACTIVITIES

Once policy instruments have been categorised, an examination of the probable effects of selected instruments is performed, by means of an analysis of the objectives of instruments, in comparison with opportunities for risk management within the production chain. An evaluation of instruments was therefore prepared, using the criteria described at Section 3.4 below.

3.3

OBJECTIVES OF AN ADDITIONAL EU POLICY

The EU has committed itself to reducing the impacts of PPPs to the point where natural resources are maintained and agriculture is sustainable. Authorised PPPs should therefore possess good efficacy and acceptable impact, when used properly.

The main objective of current PPP policies is summarised as that of striking a balance between the benefit (the prevention of crop losses) and three risks: to persons applying PPPs, from residuals in water and food products; and from PPPs emitted into the environment. Accordingly, in cases of high risk, use should be adjusted, and need of use proven. Both PPPs residuals and pests and crops should be monitored adequately. The measurement of progress (as the indicator of progress of any given objective or strategy) in reducing risk requires several indicators, the most widely used, but not sole, indicator has been chemical load (kg active substance per ha).

3.3.1 Risk Management

From an economic perspective, application of PPPs should continue only up to the level where marginal net benefits for the farmers applying them are equal to the marginal value of all risks for food, workers and the environment plus their resources costs. Presently, such optimal application levels cannot be calculated in the highly intricate area of PPPs. Risk aspects of PPPs are mainly managed by authorisation: *i.e.* an *ex-ante* performance check for active substances and PPPs, thereby influencing costs of the PPP industry. (Hazard assessment in the EU will be performed according to the Uniform (authorisation) Principles of Directive 91/414).

Other PPP-related problems, such as water contamination, come to light *ex post-facto*. The sub-Report uses the concept of a ‘PPP chain’ to identify the distinct stages at which additional EU policies may influence PPP development, distribution and application, and focuses on those stages at which the use of PPPs by way of volume and application may be influenced (therefore concentrating upon potential technological changes in agriculture, rather than in the production of PPPs).

Apart from the governmental role evident in current PPP policy, also at farm level much can be achieved to reduce the chemical load of PPPs. In this context, use was made of the findings of the sub-Report prepared by Landell Mills (on

PPP use for four different crops, studied in relation to 13 regions, and on 850 farms) summarised at Section 6 below.

Because many variables play a role, reasons for differences between farms were difficult to identify. Questionnaires forming part of this sub-Report¹ were oriented towards observing factors specifically mentioned by farmers. As a result, it is concluded that this variation will depend to a large extent on the level of control of the target pests required by the farmer.² Other factors influencing PPP use include the choice of PPPs, variation in pest and disease pressure, climatic conditions/weather conditions (partly in interaction with disease pressure, partly independent), crop rotation and prevailing cropping systems.

It was found that variation in PPP use will depend to a large extent on the level of control required for the target pests. A number of opportunities for reducing chemical loads are therefore suggested along these lines, such as ‘reducing the dominance of varieties susceptible to diseases’; ‘continued development of disease warning systems’; and ‘extension of IPM/ICM techniques’.³

3.4 SELECTION OF INSTRUMENTS

Some of the instruments examined in the sub-Report prepared by WAU receive, when their effect is analysed on an individual basis, a negative judgement (see the full text of the sub-Report in particular in relation to recording of trade, green labelling for consumers, abolition of short-term set-aside, marketable permits, and insurance against yield risk. Due to limited space, these instruments are not considered further in this summary of the sub-Report, although it should be noted that a number of these instruments given a ‘negative’ assessment were examined positively by authors of other sub-Reports.

A number of the instruments examined received a clear, positive judgement. These include speeding up the Directive 91/414 review-programme, PPP-reduction programmes, monitoring residues in water, integrated environmental programmes at farm level, programmes on resistant cultivars, recognition of integrated farming, improvement of application technology, use of covenants between EU and the PPP-industry on packaging or on monitoring, and introduction of a high uniform VAT on PPPs. Each of these measures has been selected according to criteria intended to produce an objective analysis of what additional policies are realistically available to the EU. These criteria include:

¹ Authors of this sub-Report built on results of Questionnaires distributed by the OECD.

² Other variables of importance mentioned appeared to be: crop type, crop(type) varieties, timing of treatments, dose rates, application volumes, part-crop praying and mechanical weed control.

³ In addition, reference should be made in this context to the sub-Report of Landell Mills, summarised at Section 5 below, which identified the following opportunities for reducing chemical loads: seed treatment and cold storage technique of potato; selective targeting of fields and treatments along the row; greater use of post emergence herbicides and contact herbicides; increased use of mechanical weed control where soils permit; reducing the dominance of varieties susceptible to pests; increased use and continued development of disease warning systems; extension of IPM/ICM techniques (including crop and soil monitoring).

- the *effectiveness* of the instrument - as related to the degree to which predetermined objectives are achieved through the use of a certain instrument. The efficiency of an instrument also affects the cost of reaching predetermined objectives;
- the *efficiency* of the instrument - achieving objects in the least costly way;
- the *acceptability* of an instrument - referring to the way instruments are judged by those playing an important role in targeting policies (the farming community, the general public and professional experts and so on);
- a policy instrument which is effective, efficient and acceptable does not necessarily have a high level of *enforceability* - which is related in principle to whether individuals who do not behave according to the policy objectives may be forced to do so. Enforcement, therefore, refers to the legal basis for using policy instruments and also to the cost of the monitoring necessary to detect non-compliance;
- the *institutional homogeneity* of an instrument - refers to the instrument's compatibility with the basic policy principles embedded in other government programmes and accepted by society, such as the polluter pays, and precautionary principles, and the existing EU regulatory framework;
- the requirement that there be *no large disturbances of property rights and income levels* is intended to avoid the difficulties which may result from such disturbances.

3.5 ASSESSMENT OF POLICY INSTRUMENTS

3.5.1 Regulation

Three potentially useful instruments categorised as regulation were identified: speeding up the review programme; use-reduction programmes; and monitoring of PPP residues present in water.

(a) *Speeding up the review*

Presently, Council Directive 91/414 is an important instrument for managing PPP risks. Given current progress in the reviewing programme, it must be considered extremely unlikely that the 2003 target will be reached. An ambitious working plan is therefore proposed to evaluate most of the remaining 815 active substances within the next seven years.

The effectiveness of speeding up the review is as high as the harmonisation was first planned to be. To reach the 2003 target, it is estimated that the efficiency of the authorisation procedures has to increase six-fold (if the EU capacity stays constant at the level of about 500 man years). Such a rise in efficiency might be possible *via* the 'learning by doing' approach and the diminishing importance of national authorisation policy. The general public is considered to be sceptical. From Directive 91/414, it can be assumed that some Member States (those which evaluate PPPs on other, more or less detailed data than in the harmonised

procedure) could be expected to oppose an acceleration of the review programme. Professional experts have variable opinions on speeding up the review as harmonisation is not yet complete, and some problems with enforceability remain. The homogeneity of the working plan is good, however, as it builds on the same framework as Commission Regulation 3600/92 and makes use of accumulated experience. The operation of Directive 91/414 is examined in greater detail in the sub-Report prepared by OWD, summarised at Section 2 above.

(b) Approval of a PPP-reduction plan

Examples of PPP-reduction plans can be found in the northern European countries: Sweden, Denmark, the Netherlands and Finland. In most cases, established targets are reached. A good infrastructure (experts, legal basis) and adequate monitoring of use are identified as necessary conditions for preparing and evaluating these plans

The position of the EU with respect to PPP-reduction plans is necessarily different from the position of Member States. Because most benefits of PPP-reduction plans will be realised by and within Member States, it is proposed that the EU compensates 25% of the costs of developing, communicating, effectuating and monitoring a plan.

The expected effectiveness of a PPP-reduction plan is estimated by means of a statistical analysis of existing use-reduction plans by comparing total use in countries with and without a use-reduction plan, for fungicides, herbicides and insecticides (including nematicides). The estimated results indicate an annual 4% reduction of the volume of PPP-use per year due to a PPP-reduction plan.⁴

In PPP-reduction plans, use is considered as crucial (as the efficiency of risk reduction is perceived to be less than use reduction) and if monitored at active substance level, use reduction can be translated into effects reduction with chemical and toxicological knowledge. The sub-Report prepared by OWD however has recorded significant opposition in some Member States to use reduction plans. Acceptability of a voluntary PPP-reduction plan among experts is 'variable', although some opposition from PPP-industry to a mandatory system can be expected. The instrument is, however, good according to the other criteria.

(c) Monitoring residues in water

The sub-Report found that herbicides are most frequently monitored, without, however, co-ordination. Central co-ordination and guidance from the EU should therefore define clear roles and responsibilities to comply with a specific monitoring strategy alongside improvement of analytical techniques. Existing directives, to monitor active substances that are no longer authorised, should be reconsidered. Monitoring data of concentrations in water, soil and sediment should be centrally collated in an EU database.

⁴ This effect is additional to an annual 2% reduction which holds for all EU countries included in the analysis.

Monitoring in itself does not influence the risks from PPPs, but merely records them. However, society becomes aware of risks from PPPs, and adjustments to PPP use can subsequently be proposed when considered necessary. Collection of samples and associated analyses are time-consuming and costly, although centrally collated data will enhance efficiency. There are some doubts about the acceptability of this instrument by experts.

3.5.2 Information, Persuasion and Awareness

Four instruments were categorised under this heading: training and education of farmers and retailers; promotion of Integrated Crop Management and Decision Support Systems; integrated environmental programmes at farm level: introduction of green labelling for reduced PPPs produce. For various reasons, the first two instruments are incorporated into the third, while green labeling is not considered further for reasons explained above.⁵

(a) *Integrated Environmental Programmes at Farm level*

The Integrated Environmental Programme at Farm Level ('IEPF') is an instrument of self-regulation, involving voluntary participation and combined individual and collective responsibilities. Participants enter into a (voluntary) sustainability contract with regional authorities, concerning environment aspects of agricultural practices. IEPFs are best organised within the framework of negotiations between regional farmers' groups and regional authorities. Participating farmers are as a result relieved from (most of) the existing environmental regulations and permits.

IEPFs demand extensive record-keeping. Premiums for achieving good results would, however, provide for an additional incentive to participation. EU financing is of great importance to the development and dissemination of integrated environmental programmes.

Effectiveness can be considerable. A strategy of small steps is considered to be successful. Financial costs are relatively low, but installation of IEPFs requires co-ordination between the administrative levels concerned and therefore asks for creative human efforts. If policy objectives are clear and farmers' craftsmanship is recognised, voluntary action will follow. Acceptability of this instrument (at this stage) is good. The instrument is also good in the other criteria.⁶

3.5.3 Technological and Institutional Change

Six instruments were identified under the heading of technological and institutional change: a programme regarding resistant and sensitive cultivars; use of integrated farming; improvements in application technology/inspection programmes, and measures to remove PPPs from drinking water resources are

⁵ Differing opinions on the efficiency of a green labeling scheme for PPPs suggests the need for further consideration of this instrument before a definitive judgment is arrived at.

⁶ Given the somewhat experimental status of IEPFs however this is only provisional judgement, although support from industry associations must be considered as encouraging.

considered below. Abolition of short-term set-aside and of price support for cereals are not considered as driving instruments by the full sub-Report. Further consideration of these instruments is reproduced in the sub-Report prepared Produce Studies, at Section 4 below.

(a) Programme on resistant and sensitive cultivars

Crop cultivars differ in their sensitivity to pests, and therefore affect the yield losses associated with lower PPP input. Epidemics can be slowed down by improving resistance of cultivars by reducing the frequency of sensitive cultivars in a crop rotation, (including by means of a ban) and by improving the regional diversity in the growing of crop cultivars.

All three instruments are considered effective and efficient on this short term. In the long term however the sub-Report questions whether resistance can be maintained, especially in the case of air-borne pests, when temporal or spatial arrangements are not accepted. The acceptability of this instrument is not always good, however.

(b) Programme on Integrated Farming

Introducing integrated farming (which is a knowledge-intensive technology) will require a change in attitude and sufficient recognition of the efforts of farmers to restrict the use of PPPs. The main instruments to stimulate integrated farming described in full in the sub-Report are: (1) increased recognition of agricultural practices which reduce use of PPPs; (2) the stimulation of balance cropping patterns and cropping systems, requiring less PPP input; and (3) the stimulation of the development of monitoring and sampling systems to learn when to apply which product, and the minimal but effective amounts of PPPs.

The potential of integrated farming systems is large, as has already been proven in many countries, both in experimental farming systems and in on-farm practice. The instrument requires public awareness, and sensitivity to and knowledge of ecological interactions among different organisms in the agro-ecosystem, although the public may resist the instrument if prices of agricultural produce increase as a result. One problem which was identified in the sub-Report is that integrated farming is very site-specific and therefore not easy to generalise or implement.

The reduction of PPPs can, however, be enhanced by proper monitoring and warning systems of pests. These are especially valuable for predictable epidemics of air-borne diseases. For soil-borne pests with very low tolerance levels for presence in the marketable plant parts by the consumers, the instrument is less effective or efficient. The acceptability of this instrument is, however, considered as good.

(c) Improvements in application technology

The EU could stimulate voluntary test programmes of equipment in use in all Member States of the EU to eliminate spillage from faulty equipment. Member States could also (as in Germany) issue listings of equipment meeting required legal standards. The size of the EU funding to be provided for implementation of this instrument could be linked with the area of arable and horticultural crops.

Eventually, the EU could opt for a mandatory system for the testing of equipment all over the EU.

Several Member States have reported that the test programmes made clear that existing equipment was more defective than expected. Testing would prevent contamination of the environment to a certain extent and avoid having to remove contamination from water at a later stage. The expectation is, however, that funding is only an efficient means if achieving improvements in the first years of the test system. After a certain period, testing should become self-supporting. Testing programmes appear to be quite acceptable to specialists, and will certainly be acceptable when voluntary (and may even be considered acceptable in a mandatory system). At present both voluntary (*e.g.*: Sweden) and mandatory (*e.g.*: Germany) systems are in place.

(d) Removal of PPPs from Drinking Water

The widespread treatment/regulation of drinking water in the EU occurs through operation of Directive 80/778, establishing a limit for plant protection products of 0.1 µg/l for single active substances (and 0.5 µg in total). In a number of Member States operation of this Directive has resulted in alterations to treatment processes and higher water charges. The sub-Report therefore proposes that information on alternative systems of water treatment be disseminated in other Member States. By way of example, the addition of chlorine into water may be replaced by alternative techniques less hazardous to human health and the environment.

Removal of PPPs from drinking water is not expected to have any effect on PPP use levels, but would rather impact only the potential risk to the consumer of residues. This instrument is also unable to give effect to any benefits of PPPs, does not impact PPP users and has negligible effect on food residue and environmental PPP emission levels. The sub-Report also identified potential risks present in cleaning processes themselves. This instrument does not represent a preventive approach, and is not in accordance with the polluter pays, source or precautionary principles of EU environmental policy.

3.5.4 Covenants/Arrangements

One instrument is categorised in the sub-Report as a viable 'arrangement': a covenant on specific aspects of PPPs. One possible covenant would concern the prevention of PPP-packaging waste. In addition to Directive 94/62/EC, concerning the management of packing and packaging of waste, a covenant at EU level is therefore proposed, to introduce the use of returnable/refillable containers or other systems of reuse or prevention.

Generally speaking, re-use of packaging is an efficient *ex ante* manner to reduce disposal of packaging waste. Acceptability of farmers is good, because PPP-packaging is redesigned to enhance workers' safety. Acceptance of the general public will only be good, however, if this covenant has clear results in terms of reduced waste.

A second covenant addresses the investigation of indications of damaging consequences of PPP use. In addition to Directive 91/414, concerning the placing of PPPs on the market, it is therefore suggested that the PPP industry assist in enhancing the availability of relevant monitoring data. The effectiveness of this second covenant is mainly indirect, as avoiding double research costs will enhance the efficiency of the authorisation process. For the acceptance of this covenant the public accessibility of the monitoring results is crucial.

If a covenant has been accepted by both participants, then (1) the threat of introducing other instruments and (2) the reputation of the PPP industry each suggest that such an agreement can in practice be enforced.

3.5.5 Economic Instruments

Of the five ‘economic’ instruments examined in the full sub-Report, the possible instrument of a uniform value added tax on PPPs was considered to provide the most a viable additional PPP policy.⁷

(a) A Uniform Value Added Tax on PPPs

This instrument is examined in this Synthesis Report, as the sub-Report considers it to be preferable to imposition of a financial or regulatory levy⁸ (described in detail in the sub-Report itself). Presently there are large differences in value added tax (VAT) on PPPs. Categorising PPPs uniformly within the high VAT rate is administratively simple, and conforms to the basic principles of the single European market. The effectiveness of the instrument is acknowledged to be limited, but the limited reduction in PPP use (about 3%) is nevertheless thought to be achieved efficiently. The evaluation on the other criteria (acceptability, enforceability and homogeneity) is also quite good.

A differentiated VAT rate (where all PPPs are included at the high rate, but where certain, high risk PPPs are included in an exceptional rate, and low risk PPPs are included in a lower VAT rate) is more targeted towards a reduction in use of high risk PPPs. Its effectiveness is therefore much higher, although not easily quantifiable. Acceptability of the measure on the part of those subject to the tax is questionable, and a general aversion against high taxes is identified.

(b) Financial Levies

The main objective of a regulatory levy is to influence the behaviour of farmers to reduce use and risk of PPPs. A levy can be used to finance programmes which reduce negative external effects of PPP-use and to reduce demand. For example, a financial levy of e.g. 10% of EU sales would raise approximately 580 million

⁷ The other economic instruments examined in greater detail in the full sub-Report were: deposit-system of old stocks, a financial or regulatory levy on PPPs; premiums to prevent water contamination; adjusting the agri-environmental measures of the CAP-reform and cross-compliance restriction on CAP-income support.

⁸ The main focus of a levy is to generate money for particular targets, for example to finance programmes to reduce environmental effects. Levies in the present context would also be intended to influence behaviour of farmers in such a way that use and/or risk of PPPs is reduced.

ECU. Because of the price elasticity of demand for PPPs a 4% reduction of PPP-use is implied with a resource cost of about 12 million ECU.

A larger financial levy might be used if: (1) a larger share of the costs are compensated, (2) larger reductions in use/risk of PPPs are required, and (3) EU or national governments must finance programmes to realize these reductions. It is estimated that the results of a 2.2 ECU per kg A.I. levy would generate a revenue of 580 million ECU. In this example, a 4.5% PPP-use reduction can be expected with a 14 million ECU efficiency loss (resource costs). Before deciding on levies, a preceding investigation of implementation and expected administration costs is advisable.

3.5.6 Private law Instruments

One instrument is categorised in the sub-Report as a viable private law instrument:

(a) PPP-Reduction Clauses in Land Lease Contracts

The incentive for the landowner in agreeing to such clauses could be that he wants to safeguard environmental concerns in general. An alternative motivation would be concerns relating to the specific land leased to the farmer. Incentives for the tenant could include the lower rent available for the lease.

Land lease varies throughout the Member States (and while high in Belgium is low in Ireland). EU Member States have special laws prescribing the lease of land, although other national legislation may also impact the possibilities for the landowner and the tenant to agree on a reduction in the use of PPPs. This policy instrument therefore presupposes some degree of civil or administrative law harmonisation, which itself brings attendant political considerations to the debate.

It is evident that not all landowners would be prepared to act in this manner. From land lease statistics it can be concluded that effectiveness will vary per member state, but is in general moderate. Efficiency is considered to be high, and enforceability good (because such an instrument would form part of the existing enforcement of land lease law in general).⁹

⁹ It should be pointed out, however, that the authors of the present synthesis Report remain somewhat sceptical that such a legal instrument at EU level is possible as a matter of EU law. Even in the event that a sufficient EU legal basis exists for such harmonising legislation, the present authors consider that such an instrument would encounter serious acceptability problems. It would be an imbalanced instrument where as in some Member States a large percentage of land is leased, while in others only very little land is leased. Similarly, while it would constrain the behaviour of tenants of leased land, owners of their own land (and therefore a majority of land use in some Member States) would not be subject to such restrictions.

3.6

FURTHER ANALYSIS OF PROMISING INSTRUMENTS

The situation with respect to PPPs in the EU is very intricate. Several hundreds of crops are grown commercially in the EU and these crops are threatened by thousands of diseases and pests, viruses, bacteria, fungi, weeds, nematodes, insects, mites, *etc.* The large number of specific crop-disease/pest combinations initially suggests that an extensive package of preventive methods and also PPPs is required. This conclusion is mitigated, however. Firstly, only the pests and diseases that cause economic damage have to be controlled and, secondly, broad spectrum PPPs are used which work on more crops and are effective, against many organisms (Oskam, *et al.*, 1992).

The large variations in conditions within the European Union, in, for example, cropping systems, form important determinants of use and risk of PPPs. In addition, climate and weather contribute to the extent of PPP-use in total and per category. The position of a country, or region as exporter or importer also plays an important role. Exporting countries have to fulfill international phytosanitary regulations, which often lead to rather high levels of PPP-use, unless products are marketed with different specifications. In addition, if crop yields are relatively high (in kilogram or in value) then crop damage results in large losses. This variety of factors therefore results in the conclusion that only a package of future measures will satisfy the objectives of an additional EU policy, a conclusion shared by the OWD sub-Report summarised above.

3.6.1 Achieving an Efficient Instrument Mix

Given this conclusion, the sections above, which emphasised the operation of selected individual instruments, must be developed to examine how a combination of instruments may be selected to achieve the objectives set for an additional EU PPP policy.

Instruments should at least qualify as the ‘economically efficient and environmentally effective’ (measured in terms of costs per equivalent unit¹⁰ of PPP-reduction). It has also been assumed in the sub-Report that estimated reductions are of ‘average risk level’. For several instruments, however, reasonable indications of costs related to the reduced use of PPPs could not be produced. It should also be noted that both estimated benefits (related for example to the environment, food safety, and workers protection) and perceived negative aspects (for example related to farm labour due to a reduction in PPP use) do not form part of this economic assessment.¹¹

The sub-Report sets out the minimum criteria to be satisfied if an instrument mix is to satisfy the objectives of an additional EU PPP policy. In particular, it is concluded that instruments must be complementary (and certainly not

¹⁰ An average kilogram of PPP (measured in active substance) is the ‘equivalent unit’.

¹¹ It should be noted that in identifying ‘economically efficient and environmentally effective instruments’ qualitative indications were available for only some instruments, while for others no figures were available. This has made it difficult, therefore, to provide a straightforward comparison of all instruments.

antagonistic); mixed at federal, regional and national level; flexible (to receive a higher priority); varied, in implementation period and in the period required to reach full effectiveness.

An efficient instrument mix depends very much on the size of the PPP risk and use reduction which is desired. The sub-Report adopts a different approach from that used in the OWD sub-Report which had grouped similar instruments to define different categories of policy options.

In this sub-Report, another approach was used, whereby three target levels were defined in a qualitative sense: a small, medium and higher risk and use reduction of PPPs at EU level.¹² These target levels are termed '*layers*'. Instruments of the first layer will be included in the next one, and so on, so that the last layer will contain all instruments. It is accepted that some arbitrary decisions have been made to come up with the results summarized in the Table overleaf.

The first layer contains four instruments which are either demonstrably very efficient (uniform VAT rates or programmes on resistant cultivars) or which are assumed to be efficient, and which also form an important precondition for other policy instruments (such as speeding the review programme). None of the instruments included at Layer I pose significant problems with other policy criteria. Layer I is also considered to form a mix with respect to different policy characteristics.

Layer II instruments require more time to be introduced (such as IEPF or an PPP-industry covenant), depend on the review programme of PPPs (possibly differentiated VAT rates) or are judged at a lower effectiveness than a programme on sensitive and resistant cultivars (such as programmes concerning application technology). The difference between the second and third layer is less distinct than that between Layers I and II, largely due to lack of available information. Instruments in the Layer II, however, did receive a better 'general judgement'. Some instruments in Layer III, however, are typical regional, and could therefore be preferred from a regional perspective above those instruments appearing in Layer II.

¹² It should be noted that the Terms of Reference specified no target level.

Layer	Description	Typical regional ? ¹³	Term (S/M/L)	Direct / Indirect	Preventive/curative
I	Speeding up review	No	Medium	Direct	Preventive
	Use/Risk Reduction Plans ¹⁴	Yes	Medium	Direct	Preventive
	Resistant Cultivars	No	Long	Indirect	Preventive
	Uniform VAT	No	Short	Direct	Preventive
II	Individual Environmental Programme at farm-level ('IEPF')	Yes	Medium/long	Indirect	Preventive
	Recognition IF/IPM	Yes	Medium	Indirect	Preventive
	Application technology	No	Medium	Direct	Preventive
	Covenant with PPP industry	No	Medium/long	Direct	Preventive
	Financial levy (small) ¹⁵	No	Short	Direct	Preventive/curative
III	Within Channel labeling	Yes	Medium/long	Indirect	Preventive
	Frequency sensitive cultivars in rotation	No	Long	Indirect	Preventive
	Differentiated VAT	No	Short	Direct	Preventive
	Financial levy (large)	No	Short	Direct	Preventive/curative
	Premiums in water catchment areas	Yes	Short/medium	Indirect	Preventive
	More focus on PPPs in 2078/92 ¹⁶	No	Medium	Indirect	Preventive
	Conditions in land leases	Yes	Medium/long	Direct	Preventive

¹³ For the regional instruments within the second layer it is suggested that the European Commission should develop a directive to define the conditions and the related compensations at national and/or regional levels, giving special attention to Integrated Environmental Programmes at Farm level.

¹⁴ Here we assume that the EU provides a 25% compensation of the costs of an approved PPP-reduction plan.

¹⁵ To be replaced by larger financial levy in Layer III.

¹⁶ See the sub-Report of Produce Studies, summarised at section 4 below for a fuller summary of the operation of Regulation 2078/92, also described in the full text of the present sub-Report.

3.7

CONCLUSIONS AND RECOMMENDATIONS

At least four different aspects have been identified as being of relevance in analysing risk of PPP use.¹⁷ All risk aspects play a role, but most attention in this Section has been given to risk in relation to the environment. It is, however, accepted that, because of the large number of active substances and the large variety of conditions for applying PPPs, it is difficult to define even one broadly accepted measure by which to assess the environmental risks attached to PPP use.

3.7.1 Directive 91/414

EU PPP-policy has a firm basis in Directive 91/414, and it is recommended that Uniform Principles should be applied to the authorization of PPPs. This intensive programme, to be followed both by the PPP industry (in providing information) and by national and EU organisations (in applying Directive and assessing active substances) has allowed the PPP industry to transfer its costs (in testing PPPs and providing the information) to be included in the price of PPPs. This implies that a part of the costs in preventing negative external effects has already been incorporated in the price of PPPs. It is not known, however, how industry distributes these costs among different PPPs.

It is likely that Directive 91/414, once implemented, will indeed result in PPP risk reduction, although implementation by 2003 requires an estimated six-fold increase in effort on the current review-programme. A redistribution of the workload among EU Member States is both helpful and efficient, as without additional measures the reliability of the EU and national Member States will be much lower. A working plan would demonstrate whether such an increased effort is realistic.

A classification of PPPs on substance intrinsic properties should be stimulated by the European Commission by broadening the classification of Council Directive 78/631.

3.7.2 Data Collection

There are at least two independent datasets on PPP sales: the data provided by the European Crop Protection Association ('ECPA') and the data of the farm account data network (FADN). Moreover, several specialized organisations gather data on the sales and use of PPPs at farm level or even crop level. According to the SSLRC sub-Report, summarised at Section 6 below, co-ordinated monitoring data of incidences of PPPs with respect to the environment are absent and should be centrally collected in an EU database.

The available information with respect to PPP use and risk should be brought into an accessible database, which can be used for research purposes. Except for the area observed environmental effects of PPPs, there is plenty of information

¹⁷ *i.e.*: Risk for the farmer of crop loss, risk of workers applying PPPs; risk in relation to residues of PPPs in food; and risk of emission of PPPs to the environment.

available, but the research in this area is weak and this is also caused by inaccessible data, which should be combined for more integrated research.

If the first recommendation is followed, several pieces of information gathering might be stopped or should be integrated with this database. Most relevant information in this respect are regional or local information on pest pressure in different crops, weather conditions and the broader set of agronomic and economic data.

3.7.3 Failed Instruments

The research for this sub-Report has, as requested, addressed several policy instruments, a number of which were found, however, not to function adequately, namely (a) recording of trade, (b) labeling of PPP-use, (c) abolition of short-term set aside, (d) use of marketable permits and (e) insurance on yield risk. In addition, restricting access to high risk PPPs has serious disadvantages with respect to acceptability, homogeneity and efficiency, although it appears to function in situations where good recording of PPP-sales and good infrastructure for monitor results are present.

The sub-Report concludes that a PPP-reduction plan will be effective (with an expected reduction of circa 4% per year over a period of years). In addition, from the available literature, it is concluded that abolishing short-term set-aside would, rather than improve the PPP use situation, result in increased PPP-use.

3.7.4 Use Reduction

On the assumption that use-reduction is an acceptable objective, the development, communication, effectuation and monitoring of PPP-use reduction plans by Member States may be stimulated by the EU, by compensating a part (25 % is suggested) of costs arising. This instrument may very well be more appropriate for implementation on the regional level. Risk reduction must, however, be accompanied by adequate and relevant risk measurement. Monitoring data of concentrations of PPPs in the environment are quite limited, but necessary to measure progress. In particular, the sub-Report concludes that benefits of monitoring of water can be enhanced in an EU coordinated programme.

Member States can be challenged by the European Commission to go further than use reduction, by monitoring use on a substance level and by targeting additional risk indicators. The European Commission is encouraged to open the discussion with the PPP-industry on a number of targeted items in use/risk reduction of PPPs.

An overview of national/regional experiences in reduction of use and risk of PPPs, provided within a rather uniform framework and in an accessible language for potential users in other parts of the EU is very useful. It belongs to the tasks of the European Commission to provide useful knowledge for local/regional and national participants in the PPP chain, and as such forms a first step in the form of a Concerted Action.

3.7.5 Integrated Environmental Programmes at Farm Level

Integrated environmental programmes at farm level (IEPFs) appear to be very promising instruments in a number of Member States, and are best organized within the framework of negotiations between regional farmers' groups and regional authorities. For reasons of both social organization and ecological homogeneity, these regions relate to relatively small rural areas, comprising only a few municipalities. IEPFs depend, however, on a good administrative infrastructure and high management skills of farmers.

Development of further integrated farming will require adjustments on the part of farmers, which should be supported by proper recognition of their efforts to reduce the use of PPPs. It is a complex innovation, however, which can be realised only by a long term plan of prototyping, supervision and guidance, as supported by relevant research. A quicker reduction of PPPs can be achieved, however, by the stimulation of monitoring and warning systems for air-borne posts.

Incorporating experiments with Individual Environmental Programmes at Farm level within the framework of 2078/92 would stimulate a promising policy instrument that deserves serious support.

3.7.6 Consumer-Driven Change

Provision of information to consumers (thereby stimulating demand for produce with reduced PPPs) by means of labelling is expected to be ineffective, although labeling may prove effective within the production and marketing channel.

Acceptability of a 'reduced-PPPs' label, additional to existing labels, might also raise difficulties, although these may be compensated for by introducing reduced PPPs labelling as a transitory precursor to environmental labelling. The European Commission can stimulate the process of within channel labelling by subsidising R&D in this area. The main developments, however, should come from participants in the particular channels.

3.7.7 Resistant Cultivars

As indicated above, a programme to develop resistant varieties to pests and to replace sensitive cultivars is considered an important contribution to the risk and use reduction of PPPs. Regulation of the use of sensitive crops and crop cultivars and of their regional distribution is considered in the sub-Report as potentially problematic, however, due to changes to the present system of property rights.

The breeding for durable pest resistance and the use of partially resistant cultivars should be stimulated, both by R&D and by researching and supporting regulation mechanisms to restrict the use of sensitive cultivars. The European Commission should also take the lead in stimulating the development of monitoring and warning systems for air-borne pests.

3.7.8 Equipment-Related Instruments

Equipment based initiatives, such as inspection programmes for application equipment contribute to a more effective use of PPPs and meet no serious disadvantages. The European Commission should make the inspection programmes for application equipment mandatory. Research on the implementation of improvements in application technology should be stimulated.

3.7.9 PPP Content in Drinking Water

Measures to remove PPPs from raw water used for drinking water belong to 'end-of-pipe' solutions which, although not very costly and potentially useful if sources go above limits, have limited curative effects. Burdening the consumer with associated costs is further not consistent with the Polluter Pays Principle. The EU should therefore participate in the further development of environmental quality limits and indicators, in particular in relation to water contamination. Premiums to prevent water contamination can best be organised at a local level.

3.7.10 CAP-Related Measures

Abolishing the price support of cereals and replacing it by additional income support is estimated to reduce PPP-use in the EU by 2 to 3% (albeit with large regional differences), although it was felt that the income, budgetary and efficiency effects make it difficult to analyse this policy instrument as part a PPP-reduction policy. CAP related measures studied in the Produce Studies sub-Report are summarised in greater detail at Section 4 below.

Adjusting agri-environmental measures of the CAP-reform to a stronger focus on PPP use/risk reduction is considered to be of limited importance, as subsidies fit better with providing landscape and nature preservation elements than with a reduced chemical load. In particular the reference quantity was felt difficult to observe. More attention, however, for PPP-use in agri-environmental measures may be useful in specific regions/circumstances.

Reduced use of PPPs as a condition for direct income support under the CAP is, however, considered potentially effective, although acceptability of this instrument among farmers is evidently low. It is suggested that a combination of other instruments (unrestricted income support and a financial levy on PPPs) would prove more efficient.

The analysis of the Landell Mills sub-Report, together with work of LEI-DLO makes clear that application levels of PPPs are farm specific and very dependent on crops and cropping systems, which are also related to soil and climate.

3.7.11 Covenants

A covenant between the EU and the PPP-industry provides an opportunity to allow the PPP-industry to use available expert knowledge in relevant policy areas. Both examples studied demonstrate efficient opportunities for covenants

and their high acceptability, and, as voluntary instruments, the relatively low cost of implementation.

3.7.12 Economic Instruments

A high VAT-percentage for all PPPs in the EU is estimated to reduce PPP-use by about 3%. A differentiated VAT-percentage, according to the risk aspects of PPPs, is expected to be more effective and efficient, but will require a broadly accepted classification system for PPPs.

A levy can be used to finance programmes which reduce negative external effects of PPP-use and to reduce demand. For example, a financial levy of *e.g.* 10% of EU sales would raise approximately 580 million ECU. Because of the price elasticity of demand for PPPs a 4% reduction of PPP-use is implied with a resource cost of about 12 million ECU. A larger financial levy might be used if: (1) a larger share of the costs are compensated, (2) larger reductions in use/risk of PPPs are required, and (3) EU or national governments must finance programmes to realize these reductions.

It is estimated that the results of a 2.2 ECU per kg A.I. levy would generate a revenue of 580 million ECU. In this example, a 4.5% PPP-use reduction can be expected with a 14 million ECU efficiency loss (resource costs).

3.7.13 Private Law Instruments

An EU Regulation is recommended to harmonize national land lease law by ruling out obstacles for reduced PPP-use in land lease contracts, with the aim of stimulating negotiations between landowner and land user, although acceptance of this instrument is likely to be reduced were this instrument to be mandatory. Effectiveness and efficiency, of reduced PPP-use land-lease contracts should be tested in areas where those contracts are in operation or will be in operation.

3.8 THE RECOMMENDED POLICY 'MIX'

The most attractive mix of instruments was found to consist of the following elements:

- 'effectuating a uniform high value added tax for plant protection products';
- 'encouraging Member States to develop a PPP-use/risk reduction plan';
- 'stimulating research and policy of generating resistant cultivars and removing sensitive ones'; and
- 'speeding up the review programme of Directive 91/414'.

One omission from this, and indeed the other Phase 2 sub-Reports, is the absence of information for making effective statements on the costs per unit of reduction of several policy instruments. It is hoped that the use of more indicators would provide much better information in this regard. In addition, the sub-Report has not taken an 'EU, national, regional, local' approach to the various proposed

policy instruments. A focus on particular regional problems is always possible, but requires specific information at regional level. Specific regional problems of PPP-use can be tackled by several instruments. The most preferable set depends on the particular situation. The European Commission may foster such developments by taking a share (say 25%) of the costs, where comparisons are made to the costs and targets of a 'standard' PPP-use/risk reduction plan.

If programmes require financial support, a financial levy as operated by Denmark would raise sufficient funds, although clear targeting of funds is important to circumvent acceptability problems.

Various Reports and studies, but also more general overviews make clear that there is a large variation in PPP-policies pursued at national or regional level (CLM. 1994; Michalek and Hanf, 1994. Agne, et al., 1995; Oskam. 1995: OWD, 1996: Pettersson, 1996; Waibel and Fleisher, 1996). Without pretending to characterise the situation in the EU, one could say that countries like Sweden, Finland and Denmark are concentrating on reducing volume of PPP-use, the number of treatments, the number of authorized PPPs, the emission of PPPs by increasing coherent policies. Germany works more along the line of the authorization process and the Netherlands concentrates on volume, impact (to the environment) and dependency reduction of PPPs. Countries like Greece, Portugal and Spain are just starting to realize the consequences of PPP-use for the environment. Within individual countries, there are also large differences: see *e.g.* Baden-Württemberg in Germany and some areas in Northern Italy, where organic farming, and IPM receive much more attention than in other parts of the country. This situation implies that Member States and regions are in quite different phases of PPP-policies, a factor which is central to identifying an additional EU PPP policy.