

Pesticide tax – the new challenge in Europe’s green tax policy

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Abstract

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The Covid 19 pandemic profoundly affected society’s social and economic life. At the same time, it accelerated another long-delayed process. This is the need to modernise taxation. The European tax legislation in income taxation has stayed the same for a long time. To some extent, it is outdated. It does not correspond to the modern societal changes and the realisation of new types of income not covered by the law. Many European countries rely heavily on their income taxes on the budget’s revenue side. The forecasts point to fewer and fewer opportunities to generate income due to the ageing working-age population. All these arguments determine the need for modernisation and gradual replacement of income taxes. The present study defends the thesis that a promising opportunity to compensate for the reduced revenues from income taxation is related to strengthening the environmental function of taxes. The possibility of limiting environmentally harmful substances such as pesticides through taxes has been analysed. This change the authors propose to achieve this in two ways. The first one requires eliminating differentiated reduced VAT rates for pesticides, plant protection materials and fertilisers unless the latter are organic. The second one proposes the possibility of introducing a tax on pesticides. Such a tax could limit their use as well as generate new revenue. In this regard, the experience of the few countries applying a pesticide tax is analysed. The various options for determining the tax base as a critical point in defining the tax are argued.

Keywords: pesticide tax; green tax policy; tax policy modernisation; VAT rates

Introduction

The Common Agricultural Policy (CAP) celebrates its 60th anniversary in 2022. CAP is one of Europe’s longest-running policies. Its budget is approximately 336 billion, or one-third of the total EU budget. The EU agricultural policy will contribute 40% of its budget to climate action. Along with providing quality food for the population and a fair standard of living for farmers, CAP aims to preserve natural resources and respect the environment. In December 2021, the Council adopted an even more acceptable and greener farmer policy for 2023-2027. The new CAP focuses even more in-depth on green requirements. Specific payments will be provided for those farmers that adopt climate-sensitive and nature-friendly practices in line with European Green

Deal objectivities. These practices include organic farming, crop rotation, and the preservation of carbon-rich soils. Similar approaches could be supported by instruments such as environmental taxes. A green taxation is a unique tool for achieving such goals and protecting the environment. Introducing different kinds of green taxes could change farmers’ behaviour and direct it towards more meaningful environment-friendly behaviour. The new and greener CAP for 2023-2027 will be conducted in extreme years of the world’s economy recovering after Covid 19 crisis.

The Covid 19 pandemic profoundly affected society’s social and economic life. At the same time, it accelerated another long-delayed process. This is the need to modernise taxation. It must be synchronised with the dynamics of a rapidly changing society. According to the focus of the EC,

“The world is changing. Tax should too”. This is a time-delayed need that has accelerated the Covid crisis. Unlike previous problems, this one is significantly different and severe, and its dimensions are economical and social. Therefore, the measures that need to be taken are considerably more expensive and require additional assistance. The EU indeed provides this aid.

On 27.05.2020, the EC adopted the Next Generation EU recovery plan, providing funds for EUR 750 billion. This is a loan that Europe must start to pay off by 2028 and 2058. That is why the EU needs additional sources of revenue that could be secured through some change in taxation. A comparison with the measures taken to overcome the effects of the financial crisis in 2009 shows that the most common step taken to increase fiscal revenues from individual countries was to increase VAT rates. Since then, they have had values ranging from a maximum of 25% in respective countries. This is the reason why such a measure remains exhausted.

Material and Methods

The current investigation analyses the vital need for tax policy modernisation. Special attention is paid to the new greener CAP. The last two can synchronise their efforts using green taxes—the study analyses pesticide taxes in some Scandinavian countries. The research is based on official statistical data, the European Commission, the Ministry of Agriculture, and literature review documents. The data for the indicators used in the investigation are taken mainly from Eurostat. The time horizon of the analysed indicators covers 8-10 years. Logical methods are applied, such as induction and deduction, analysis and synthesis, the abstract-logical

approach, comparative analysis, the historical process, tabular and graphical presentation of individual trends, and the resulting conclusions.

The research aims to assess the pesticide tax as an excellent new challenge in Europe’s green tax policy. The research objectives are:

- to prove the vital need for tax modernisation in European countries
- to analyse the opportunities to compensate for the reduced revenues from income taxation with the ecological tax, such as the pesticide tax
- to investigate different approaches in pesticides tax and its tax base

Results and Discussion

The need to modernise European taxation to meet the dynamics of modern society has long been recognised. Several main problems characterise European legislation. One of the serious ones is the strong dependence of state budgets on labour taxes and social security contributions. We can trace it in the following Figure 1.

Figure 1 shows that an exclusive predominance of taxes on labour can be observed in the EU countries. With social security contributions, labour taxes have formed a sustainable share of over 60% over the past ten years. Of course, these summary data do not reflect the specifics of the tax policies of individual countries. We can trace it in the following Figure 2.

The dynamics of the analysed indicators are most impressive in Bulgaria, Sweden, Hungary and Croatia. These countries have an almost even distribution of risk and nearly

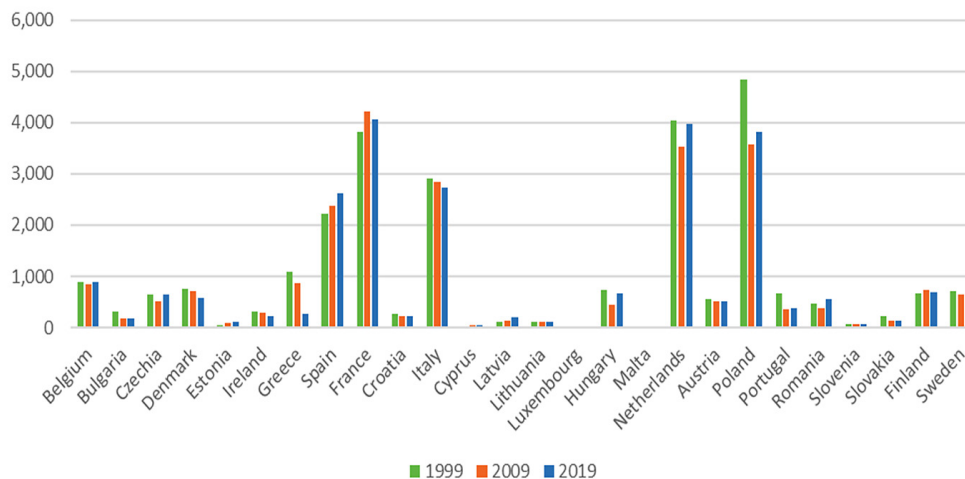


Fig. 1. Energy consumption by agriculture (1000 tonnes of oil equivalent)

Source: Author’s interpretation according to Eurostat data

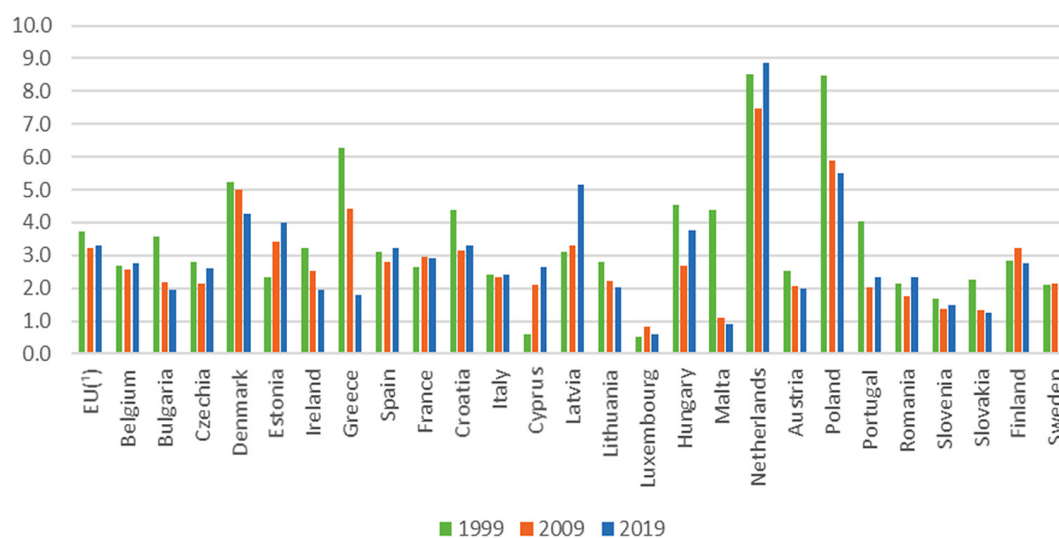


Fig. 2. Share of energy consumption by agriculture in final energy consumption (%)

Source: Author’s interpretation according to Eurostat data

equality between direct and indirect taxes. In the majority of countries, the dependence of the fiscal authorities on labour taxes and social security contributions is visible. The share of these taxes in only five countries is below 60%. The backbone of the fiscal revenue consists of social security contributions with their claim for 2020 of 35.5%, personal income tax – of 30.2% and VAT – of 16.8%. Other taxes have significantly lower values, such as corporate taxes – 5.9%, environmental taxes – 5.8%, and property taxes – 1.3%.

The high tax burden on income tax in many high-income European countries should be reconsidered in light of the current situation. The Covid crisis has had an extremely detrimental effect on the global labour market. The closure of several businesses has left many workers and employees in restaurants, tourism and others without work and income. A possible measure to stimulate the labour market is to alleviate the tax burden on labour in the short term. It is also necessary to view another longer-term but expected demographic trend. According to Eurostat data, the working-age population between 20 and 64 will decline. By 2019, it accounts for 59% of the people of European countries. By 2070, this share is expected to fall to 51%. Over the next 50 years, the projected population will decline by 45 million or approximately 17%. This trend is combined with a decrease in children and young people from 0 to 19 years, which will fall by 12.6 million for the same period.

Another current negative trend in income taxation is related to the digitalisation of the economy. It was accelerated not only by the dynamics of modern society but also by the Covid crisis. After all lockdowns, people have become even

more accustomed to e-shopping, food orders and home delivery products. New professions spread faster, such as influencers, YouTubers, and vloggers. The income legislation of most countries still does not consider such types of income, which remain outside the scope of taxation. All this requires a change in income legislation. To avoid a sharp shock to revenue due to the current dependence on labour taxes and social security contributions, a gradual but steady downward trend in this dependence must begin. This requires a modernisation of the tax systems of European countries concerning income taxation (Yankov, 2012).

Compensation for the reduced income tax revenues could be received with other taxes with a smaller share, such as corporate tax and environmental and property taxes. Given the specifics of the latter and their inability to be a significant source of revenue for the budget, the choice quickly falls on environmental taxes. Like the excise duties, they correct the behaviour of the taxpayers. These taxes are paid for goods and services with low elasticity of demand. Hence, according to Ramsey’s rule, they can generate more revenue. They can compensate at least partly for the reduction in revenues from labour taxes and provide part of the funding for the so-called green transition towards climate neutrality by 2050 year. The fiscal point of view is only one side of the problem. Environmental taxes can indeed change the behaviour of taxpayers towards a more climate-friendly attitude. Ecology is also one of the three pillars that the current President of the European Commission, Ursula von der Leyen, set in her EU governance policy in 2019, along with the problems of migration and digitalisation. She defines three European

Commission missions in the field of health, environment and agricultural development:

- EU mission on health: “I want you to work on protecting plant health, reducing pesticide dependency and stimulating the take-up of low-risk and nonchemical alternatives.”
- EU mission on the environment: “You will lead on delivering... a wide-ranging approach looking at air and water quality, hazardous chemicals, emissions, pesticides and endocrine disruptors.”
- EU mission on agriculture and rural development: “you should ensure that agriculture and food production contribute to our climate, environmental and biodiversity goals, notably by reducing the use of pesticides, fertilisers and chemicals in Europe and beyond.”

The common feature in the three missions is reducing pesticides, fertilisers and chemicals to improve the quality of life.

Pesticides can increase the yield and quality of agricultural production, leading to increased profits and employment in agriculture. However, studies show pesticides risk human health and the environment (Thundiyl et al., 2008). Although there are no official statistics on the damage caused by pesticides, some studies have shown their harmful effects. The annual incidence of acute pesticide poisoning in some countries among agricultural workers is 18.2 per 100 000 full-time workers (Kishi et al., 2001) and 7.4 per 1 million among students (Alarcon et al., 2005). Pesticides pollute water sources and cause soil degradation, reducing long-term productivity (European Environment Agency, 2020). Pesticides are transported to water basins by rainfall and reach the seas through running water. Studies in Germany have found pesticides in large rivers and streams with corresponding adverse effects on river ecosystems (Knillmann et al., 2019; Beketov et al., 2013).

The adoption of Directive 2009/128 / EC of the European Parliament and the Council aims at the sustainable use of pesticides to “reduce the risks and impacts of pesticide use on human health and the environment, and to promote the development and implementation of pesticides integrated pest management and alternative approaches or techniques to reduce dependence on pesticide use”. In the framework of the Green Deal, the European Commission specifies the goal of halving the use and risk of chemical pesticides, as well as the use of higher-risk pesticides in the EU by 2030 (<https://ec.europa.eu/>, 2021)

This process could be catalysed and guided by skilful tax treatment that generates revenue on the one hand and limits pesticide consumption on the other. Pesticide taxation aims not to eliminate pesticides but to move to more sustainable

agricultural practices that do not affect agricultural productivity. Although no direct causal link has been established between pesticide taxes and restrictions on their use, the benefits of tax revenue allocation for research into sustainable farming practices are undeniable (Söderholm et al., 2008).

We can trace the sales of pesticides with the following Figure 3.

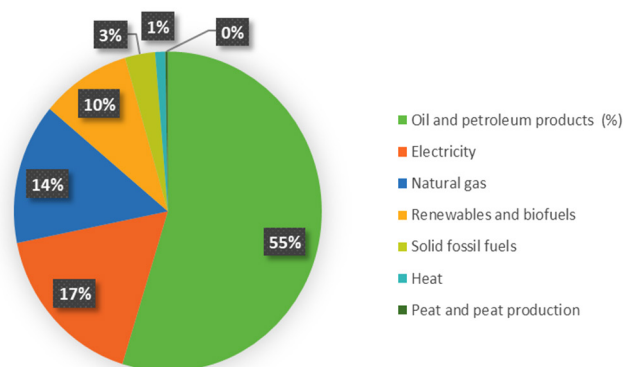


Fig. 3. Share of fuel type in energy consumption by agriculture, EU, 2019

Source: Author’s interpretation according to Eurostat data

In the predominant number of years, sales of pesticides show relatively constant values, ranging between 350 000 and 370 000 tons. For the first time in 2019, there was a severe decline in sales of 6%, when the sales for the first time fell to approximately 333 000 t. These values do not reflect differences between countries. There are several countries with significantly higher reported pesticide sales. They are also among the major exporters of agricultural products. According to the latest available data from 2019, these countries are Spain, France, Italy, Germany and Poland. The percentage change in sales of pesticides in individual countries can be traced in Figure 4.

The most impressive increase is in Bulgaria, wherein in eight years, sales have increased by 400%, followed by Cyprus – by 101% and Estonia by 62%. The large pesticide users in Poland, Germany and Spain are characterised by a slight increase of 11%, 3% and 3%, respectively. In the other two countries in this group – France and Italy – there was a decrease in sales by 11% and 31%, respectively. The following statement will trace a specific connection between this indicator and the tax treatment of pesticides.

Tax practices in different European countries could be divided into two types depending on the tax treatment with VAT and applying a pesticide tax directly. The first one is more common and criticised. It is linked to the possibility of using a reduced VAT rate for agricultural inputs in individual countries.

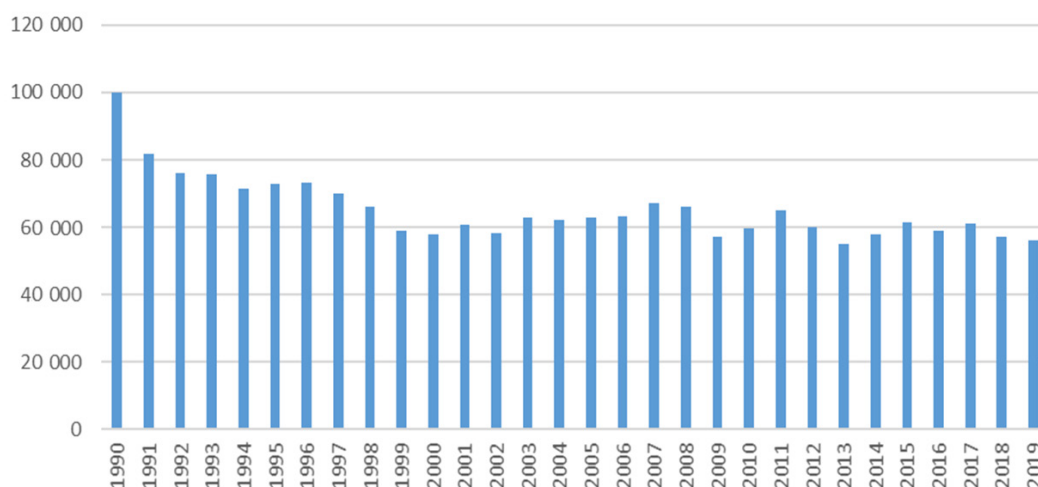


Fig. 4. Greenhouse gas emissions in Bulgaria – tonnes of CO₂ equivalent, thousands

Source: Author’s interpretation based on data from stats.oecd.org

The agricultural inputs are divided into two main groups: 1. Pesticides, Plant Protection Materials; 2. Fertilisers. The scale of their application can be traced from the data in Table 1.

The data in the table show that 13 countries apply reduced VAT rates to agricultural inputs. The reduced tax rates aim to stimulate the consumption of these goods. However, whether the legislations differentiate depending on the specific harm or benefit of their consumption arises. The data show that such a distinction sometimes exists but sometimes does not. For example, in Belgium, reduced rates of 6 and 12% tax fertilisers, pesticides and plant protection products approved by the Ministry of Agriculture, including products used as fertilisers, whether or not mixed with recognised preparations for plant protection. In Germany, pesticides and plant protection materials are taxed at the standard rate. However, the consumption of organic

rather than chemical fertilisers is stimulated by a reduced rate of 7%.

In Ireland, a zero rate characterises the supply of certain fertilisers in packages of not less than 10 kg. At the same time, pesticides and plant protection materials are subject to the standard amount of the tax. Spain has the most significant sales of pesticides in the EU. The country taxes all pesticides, plant protection materials and fertilisers at a reduced rate of 10%. France allows a lower VAT rate of 10% for pesticides, plant protection materials and fertilisers listed in the annexes to EC Regulation 889/5.09.2008 on organic production. A reduced rate of 4% in Italy taxes organic fertilisers used in organic farming. Cyprus imposes 5% on all pesticides, plant protection materials and fertilisers. In Luxembourg, the standard rate applies to pesticides and plant protection materials, while the reduced rate of 3%

Table 1. Comparison of minimum levels of taxation applicable to motor fuels used in agriculture according to Council Directive 2003/96 / EC and levels of taxation for motor fuels in Bulgaria

Motor fuels	Minimum levels of taxation applicable to motor fuels used in agriculture	Minimum levels of taxation applicable to motor fuels 2004/2011	The tax rate for motor fuels in Bulgaria
Gas oil (in euro per 1000 l) CN codes 2710 19 41 to 2710 19 49	21	302/310	330.3
Kerosene (in euro per 1000 l) CN codes 2710 19 21 and 2710 19 25	21	302/330	330.3
LPG (in euro per 1000 kg) CN code 2711 12 11 to 2711 19 00	41	125/125	173.8
Natural gas (in euro per gigajoule gross calorific value) CN code 2711 11 00 and 2711 21 00	0.3	2.6/2.6	0.43

Source: Interpretation of authors under Directive 2003/93 / EC

applies to fertilisers. Austria also stimulates the consumption of organic fertilisers by reducing the rate to 13%.

Such a distinction does not exist in Poland, and all pesticides, plant protection materials and fertilisers use the reduced 8% VAT rate. The situation is similar in Portugal, Romania and Slovenia, where these groups of goods are taxed at 6%, 9% and 9.5%, respectively. Therefore, six countries envisage a reduced rate to stimulate the consumption of pesticides and fertilisers, regardless of the harm they cause. Such practice contradicts the natural logic of the tax, which must perform its environmental function. Reduced rates should only exist for organic preparations. Otherwise, their application should be eliminated as an option for the countries that apply for them. The six countries are currently mentioned: Cyprus, Romania, Poland, Slovenia, Portugal and Spain.

The abolition of reduced VAT rates for pesticides could be combined with another effective measure with very little territorial distribution. Such a possibility is the introduction of a separate tax on them. Applying such a tax on pesticides means the much-needed polluter pay principle is finally being considered. Using pesticide tax is an opportunity that is increasingly being discussed among professionals. For example, in his article, prof. Frank Berense recommended the introduction of a progressive tax, which “is based on farmers’ purchase per unit area of pesticides, antibiotics and imported animal feed such as soya beans.” According to him, this is a necessity that should be part of the long-awaited reform of the CAP. Such a practice still exists today, but it is constrained. It spreads, especially among the Scandinavian countries. These are Denmark, Finland, Iceland, Norway and Sweden. Italy and France join later to them.

The pesticide tax is appropriate for all occasions products with high toxic content are used. The design of the tax is essential, including the choice of the proper tax rate, the method of introduction (phased or sudden), and the definition of exceptions. The main advantages of the tax are its accessible collection and administration. It stimulates the orientation of farmers towards more sustainable agricultural practices. The disadvantage of the tax is that it can be regressive and unfair for specific population segments. It may cause tensions between farmers and pesticide producers and provoke tax evasion. Opponents of the tax believe that limiting pesticides will reduce yields without lower-toxicity alternatives. They feel low tax rates will not lead to real restrictions on pesticide use. It is necessary to have differentiated rates according to the harmful content, which would be more environmentally efficient than a single simpler tax.

The pesticide aims for public health, reduction of pollution caused by pesticide runoff, protection of the soil,

diversification of the structure of crops, increase of fiscal revenues, etc. States use pesticide tax revenues differently. Some countries (Denmark, Austria, Finland) use the payments to reduce other taxes and support subsidies. In other countries (Sweden, the Netherlands, and Norway), the revenues come directly from the national budget. Third countries (Norway, Denmark, Kenya) direct the collected payments to specific targeted projects – support for sustainable agriculture, research on innovative practices, training and more. The fourth group of countries (Sweden and the Netherlands) use the revenues to cover the costs of pesticide control.

In addition to taxes, some countries apply pesticide fees. Pesticides are included in the registration procedures and the selections used for authorisation. Authorities collect registration fees in some countries (the United Kingdom, Germany, Sweden, Australia, Canada, USA, etc.). In others, costs for import permits for pesticides vary depending on the toxicity of pesticides (Mozambique, Kenya).

Usually, manufacturers and importers pay pesticide tax. Pesticide exports are exempt from taxes. A page distinguishes between commercial and non-commercial use of pesticides, and the rates differ. In some countries, there are differences depending on who pays the tax – farmers, pesticide distributors, pesticide producers and importers.

Different countries have different approaches to choosing a tax base. Pesticide taxes are levied on the pesticide dose, kilogram of the active ingredient, and the risk of pesticide or ad valorem. The frequent treatment with pesticides is also considered an alternative tax base. The rate varies from country to country. It can be uniform for all pesticides or different depending on the toxicity of the primary substance and its decomposition in the soil (Norway, Denmark, France).

Denmark is the country with the highest pesticide tax. It first introduced a pesticide tax in 1986 under the Danish National Pesticide Action Plan. Its main goal is to reduce the consumption of pesticides by 50% in 10 years and direct it to less harmful preparations. The tax is 3% on the wholesale price of all pesticides, regardless of the environmental damage they cause. The revenues generated are insignificant and mainly cover the administrative costs associated with approving pesticides. The results show (Andersen et al., 2001) that the introduced tax does not affect pesticide consumption and cannot limit it by 50%. Denmark adopted a new ad valorem tax on the highest current wholesale price in 1996. Pesticides are divided into several categories with different tax rates. The presumption is that the cost of treatment varies in different values depending on the type of pesticide. Therefore, fungicides, herbicides

and growth regulators are subject to lower rates of 15% and insecticides to higher rates of 27%. The higher rate on the latter is their relatively lower price.

The pesticide use is measured in kilograms and, according to treatment intensity, the number of doses per hectare of arable land. The tax is levied only on locally produced or imported goods. Thus, the final price of the product includes the tax. All importers and manufacturers of pesticides are specially registered under Danish law. A particular label marks the pesticides for which tax has been paid (Pedersen et al., 2015). This specific label indicates the tax category and the maximum product price to avoid the abuse of fictitious lower prices with a lower tax than the real ones. The customs and tax authorities control the tax. Exports are exempt from taxation. Funds raised from the pesticide tax are returned to the sector. According to a study (Ecotec, 2001), 55% of the funds are raised to compensate farmers through lower land taxes. 10% is used for other support methods, such as subsidies for organic agriculture and water environment protection. The remaining 35% are used to research and monitor environmental pesticides.

The revenues collected proved insufficient, and the government increased the tax rates in 1998. Thus insecticides are taxed at 37%, and for fungicides, herbicides and growth regulators, the rate is again lower by 25% (Sjobeg, 2005).

Concerning the Danish implementation of the EU Water Framework Directive, the pesticide tax was amended on 1.07. 2013. As of this date, it is changing from taxation based on value/price / to toxicity. The most severe change concerns the tax measurement. The tax is measured not according to value and treatment frequency. It is measured with a Pesticide Load Indicator. It considers three parameters: 1) Potential impact on human health, 2) Environmental behaviour, and 3) Environmental toxicity. The human health indicator measures the operator's load when handling and applying pesticides and considers danger symbols on the package and so-called risk phrases on the label. Environmental behaviour expresses how fast the pesticides degrade in the soil, the risk of accumulation in the food chain, and leaching to groundwater. Environmental toxicity measures the pesticide's toxicity for animals and plants in the field (for example, earthworms and bees) and the surrounding nature (for example, fish and birds). The new way of determining the tax reduces its burden for specific categories of pesticides and a sharp increase for others with a high load on the environment. This change aims to encourage farmers to use pesticides with less harmful effects on the environment and human health. The old taxation scheme remains for biocides, though with higher tax rates. Measures to compensate farmers have been taken into ac-

count, and the changed tax. The land tax has been further reduced. (Böcker et al., 2016). Funds raised from the pesticide tax return to agriculture or the environment. This refund serves the government as a tool to reduce farmers' resistance and fight against pesticide tax (Pedersen, 2016).

Sweden is the first country to introduce a pesticide tax. Initially, it existed as a fee. The government decided to turn the payment into a tax in 1995, with the revenue increase in the next ten years. Its purpose is to reduce the risk to the environment and health due to the use of pesticides. The Swedish government plans to reduce pesticides by 50% by the end of 1990 and again by 1996. The collected revenues cover the costs of pesticide action programs. These programs are also financed at the state's expense since 1995. In 1995 the fee was replaced with a tax and entered the state budget accordingly. Initially, a flat tax was introduced in absolute terms per kilogram of active substance regardless of its specific meaning and toxicity. Its value in 1984 was 4 SEK per active kilo substance. In 1988 it was increased to SEK 8, SEK 20 in 1994, SEK 30, and since August 2015, it has been SEK 34. Wood preservatives are exempted from the tax. (Ecotec, 2001).

A price regulation charge was introduced in 1986, and the pesticide tax. Its purpose is to support the export of agricultural products. In 1992 it was abolished with the country's accession to the EU. Importers and manufacturers of pesticides are registered. Importers have to submit declarations every month. Upon registration, they pay a fee. The revenues from the price cover the National Chemical Inspectorate's maintenance costs, which control the pesticides. They must be registered and approved by the inspectorate. This method of determining the tax based on the amount of active substance creates advantages and disadvantages for pesticides with different dosages. The pesticides applied in small doses benefit from the low tax. At the same time, the pesticides involved in higher amounts are characterised by disadvantages due to the higher tax. In addition, this taxation mechanism does not provide advantages and incentives for using low-risk products in organic farming. The Swedish pesticide tax is considered to have severe disadvantages because of these two circumstances. It is considered to be subject to review and change.

Norway was the second European country to introduce a tax on pesticides in 1988 when Parliament adopted an Action Plan to Reduce Pesticide Use. Initially, the tax is introduced as ad valorem on the wholesale price. Its initial rate was 2%, but it gradually rose to 8% in 1989, 11% in 1990, 13% in 1991 and 15.5% in 1996 (Andersen et al., 2001). The revenues raised are almost entirely earmarked for various environmental initiatives. A regulatory fee was

introduced in 1988, next to the tax, to finance all pesticide regulation and approval costs. Its rate also changes; from the initial 6%, it gradually becomes 7% and 9%. Defining the tax as ad valorem on the price of pesticides makes prefer the pesticides with a lower price than the more expensive ones. This method of taxation does not connect the tax and the damage to the environment and human health. This is a problem that a mainly Norwegian working group is addressing to assess the impact and use of pesticides. It was established in 1998 and strongly recommends a reduction in pesticide use. It, in turn, is associated with an increase in the tax. The commission recommends that the increased revenues be returned and invested in agriculture with specific measures for environmental protection. Despite the higher costs of administering the tax due to the change, the commission believes that the difference will not be significant after a transitional period, especially against increased revenues. Thus, a fundamentally new way of defining the tax has been adopted and approved since March 1999. It is defined as a multiplication of the base and additional rate. The pesticides are divided into seven groups depending on their environmental and human health impact. The base rate is (NOK 25). It is multiplied by a factor for the tax band. Its value varies from 0.5 to 150:

Tax per hectare = 25 x factor for tax band

The factor for the tax band is determined according to the pesticide classification in one of the seven categories. They are classified into low-risk, medium-risk, and high-risk environmental and human health. The combination of the different types of risk under the two criteria leads to the differentiation of the following seven categories, each characterised by an additional factor (Spikkerud et al., 2005):

Tax band 1 (0.5 x base rate): Products with low health and environmental risk.

Tax band 2 (3 x base rate): Products with low health and medium environmental risks or medium health risks and low environmental risks.

Tax band 3 (5 x base rate): Products with low health and high environmental risks, medium health and medium environmental risks, or high health and low environmental risks.

Tax band 4 (7 x base rate): Products with high health and medium environmental risks or medium health and high environmental risks.

Tax band 5 (9 x base rate): Products with high health and environmental risk.

Tax band 6 (50 x base rate): Concentrated consumer products.

Tax band 7 (150 x base rate): Ready-for-use consumer products.

Table 2. Share of remittance of excise duty on purchased gas oil used in primary agricultural production and in absolute amount 2007-2009/2014-2019

Year	Amount (in euros)	% of Tax Revenue from Excise Duties
2007	32 273 153	1,90
2008	41 332 579	2,00
2009	43 889 502	2,23
2014	22 093 085	1,07
2015	20 741 599	0,90
2016	37 111 506	1,51
2017	42 940 618	1,69
2018	42 941 439	1,61
2019	42 730 488	1,52

Source: Author's interpretation based on data from Ministry of Finance

Graphically, we can trace the seven categories and the determination of the factor depending on the health and environmental indicators in Table 2.

The determining factor is multiplied by the base rate, and the tax liability is obtained. The conversion into litres or kilograms is according to the following formula:

Tax per kg or litre = 25 x factor x 1000 / standard area dose

The standard area dose (USA) is the maximum application rate per treatment in grams or millilitres per decare for the main crop using pesticides. SAD turns the tax per hectare into a per kg or litre product. The overall assessment and analysis show that the tax system is determined not on the value but based on the perfect area. However, deciding which crops represent the product's main application area is sometimes difficult, hence misidentifying SAD.

Three separate indicators are used to assess the impact of pesticides on human health. These are 1) Intrinsic properties, 2) Exposure during mixing, and 3) Exposure during spraying. The pesticides risk is assessed as a combination of the impact of eight other indicators:

$$\text{Total score for environment} = \text{Te} + \text{Ta} + \text{Tb} + \text{A} + \text{L} + \text{P} + \text{B} + \text{F},$$

where: Te – Score for earthworms;

Ta – Score for bees and other arthropods;

Tb – Score for birds;

A – Score for aquatic organisms;

L – Score for leaching potential;

P – Score for persistence;

B – Score for bioaccumulation;

F – Score for formulation type.

If a pesticide contains several active substances, the points are taken for the one with the highest points. The pesticides used in organic farming are not taxed.

The government combines fiscal and environmental functions in Belgium with the Ecotax Law. Its purpose is the same as in other countries. Higher prices form a different environmentally-friendly consumer behaviour. In the draft law from 1993, pesticides are just one of a total of six product categories to be taxed with an eco-tax. The part related to the pesticide tax was never accepted due to its many exceptions and political and administrative difficulties in its application (Ecotec, 2001).

The first version of the draft law introduces three tax rates according to the product’s toxicity. The highest tax is for very toxic substances – 10 BEF/gram. 5 BEF/gram is poisonous, and 2 BEF/gram is for slightly toxic products. The next revision reduces the number of tax rates. They become applicable per unit of active substance contained in the pesticide. The rates of 10 BEF/gram and 2 BEF/gram differ depending on the active substance’s toxicity level. The higher rate imposes a list of products containing substances in quantities exceeding the perceived toxicity level. All others who do not exceed these limits are taxed at a lower rate. The proposals for introducing the pesticide tax have met many discussions about the classification of products and have never been accepted (De Clerq, 1996). The Pesticides Tax Draft Law has yet to come into force. The federal government introduced a tax on the purchase of pesticides for agricultural purposes to limit the spread of pesticides in soil and water in March 1999. Its rate is only – 0.1 BEF per gram of active substance. It applies to the same substances covered by the eco-tax when put on the Belgian market, i.e. sold to the “first client”, but for agricultural use only. The low value of the charge determines its good perception and the lack of protests against it. Belgium is still considering whether introducing a pesticide tax would be appropriate.

France introduced a tax on pesticides in 1999. It imposes a tax on substances classified as hazardous. The purpose of the tax is fiscal. It aims to encourage consumers and producers to use less harmful substances. Pesticides are divided into seven categories depending on their toxicity, and the tax is progressive, increasing from 381 to 1677 euros/ton. The first category is pesticides with low toxicity that are not subject to taxation, unlike the other six:

The second category is 381 euros / t

The third category is 610 euros / t

Fourth category 838 euro / t

Fifth category 1067 euro / t

Sixth category 1372 euro / t

Seventh category 1677 euro / t

In 2008 the tax on pesticides was replaced with a new one, the so-called tax on diffuse agricultural pollution. It

taxes the sale of pesticides, which are no longer classified into seven but only three categories, depending on the toxicity of the substances they contain. The tax is paid by consumers and collected by traders to be more tangible for buyers (OECD, 2017). The tax is again progressive and initially undergoes frequent changes at the beginning. These changes can be traced in the following Table 3.

Table 3 State aid budget and number of farmers benefiting from aid

Year	Number of farmers	Budget aid in million euros
2016	6716	42.95
2017	8250	42.95
2018	9597	42.95
2019	10 734	42.95
2020	11 634	51.13
2021	12 131	51.13

Source: Author’s interpretation based on data from Ministry of Agriculture, Food and Forestry

The last most hazardous category is undergoing the most significant rise. However, despite the almost doubling of the tax rate, it is considered too small to have the effect of limiting pesticide consumption. Revenues from collected taxes go to water and waste treatment operations. In this form, the tax exists from 2008 to 2018. The environmental plan to reduce pesticide consumption by 50% for these ten years has yet to be realised. In 2015 France revised its strategy and set the same limit of 50% but postponed the deadline for achieving it from 2018 to 2025. By 2020, a reduction of 25% should be achieved, and the remaining 25% – until 2025. The following changes in December 2018 are related to increased taxed pesticides and tax rates. At the same time, measures are being taken to limit non-agricultural pesticides by, for example, municipalities in parks and gardens, households, etc. In 2014, France stopped using reduced VAT rates for pesticides.

There are different challenges to applying pesticide legislation, and compromises must be made when using these instruments. This tax policy confronts the strength of the position that there is a negative impact on yields, hence the profits and competitiveness of the economic entities. Studies note that reducing pesticide use by up to 40% is possible without significantly reducing productivity and employment in agriculture. (Lechenet et al., 2017; Femenia, 2016; Grovermann et al., 2017; Freier et al., 2014). The fact is that taxation related to environmental protection is expanding among the EU countries and outside its boundaries. The number of countries applying such environmental instruments increases. They can use the experience and lessons

learned by the pioneer countries in the design and effective use of such devices of fiscal policy.

Conclusions

Analysing pesticide application practices in Europe allows us to summarise several main conclusions.

A change in income taxation is needed worldwide. The preconditions for such a change are related to the lack of a recent legislation update according to the dynamics of modern society. On the other hand, the need for change is associated with the strong dependence of the fiscal system on income tax revenues and their future forecast for declining dynamics.

Reduced income tax revenues suggest an alternative to another source of revenue. It could be traced to environmental taxes, as they should perform fiscal and ecological functions. They, in turn, should finally be included in the tax policy of the countries on a larger scale, given the deteriorating quality of the environment.

The practice of many European countries, which apply reduced VAT rates to non-essential goods such as pesticides, is unacceptable in this respect. Reduced rates could be applicable in this case, but only about, for example, organic preparations.

The practice of pesticide taxation in Europe is limited at the moment. At present, this is observed mainly in the Scandinavian countries. On the other hand, their experience could construct a new effective tax that skillfully combines fiscal with environmental functions.

A key point for an effective pesticide tax is determining the tax rate and base. An irrational decision is that it should be just the selling price. It is appropriate to link the tax base to the toxicity of individual substances contained in different types of pesticides. However, this increases the cost of controlling emissions and complicates tax design.

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