PLANT PROTECTION PRODUCTS USAGE ON CROPS IN MALTA 2005

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This is the first comprehensive survey of plant protection product use on crops grown commercially in Malta and Gozo and covers treatments applied to crops prior to planting or drilling in the autumn of 2004 through to harvest in 2005. Plant protection product treatments to permanent crops such as orchards and vineyards were assessed over the same time period. Information on plant protection products usage was collected from a stratified sample of farmers and growers across Malta and Gozo with holdings larger than 0.1 ha, and the data collected raised using information from the 2001 farm census, to give national estimates of use.

Twenty crops were included in the survey: wheat grown for fodder, potatoes, broad beans, onions, vegetable marrows, cauliflowers, cabbages, carrots, lettuce, peas, tomatoes (both outdoor and under protection), sugar melons and water melons, grapes, strawberries, peaches, nectarines, olives and citrus crops.

Large areas of some crops remained untreated with any plant protection products and over half the total area grown of broad beans, lettuce, olives and wheat received no treatment. Other crops were more frequently treated, however, with at least three quarters of all crops of carrots, cauliflowers, grapes, nectarines, onions, peaches, peas, potatoes, strawberries, tomatoes, marrows and watermelons receiving at least one treatment with plant protection products.

Control of disease was the most frequent reason for plant protection products use, with fungicides dominating usage by both weight of plant protection products applied and area treated. Crops of grapes, onions, peas, potatoes, strawberries, tomatoes, and marrows all received, on average, over three applications of fungicide during the growing season, the most popular products being those based on dithiocarbamates, such as mancozeb, the phenyl amides metalaxyl and benalaxyl or sulphur.

Herbicides were used only infrequently in crop production. Usage was only important in wheat and onions, where 43% and 26% respectively of the area grown was treated, each treated crop receiving, on average, a single application.

Use of insecticides was an important aspect of crop production for cauliflowers, nectarines, peaches, strawberries, tomatoes and watermelons, with at least 60% of the crop receiving treatment. Treated crops received, on average, at least two treatments.

Other plant protection products groups were largely unimportant with the exception of acaricide use on strawberries, where one third of the crop was treated. Where used, crops were treated, on average, at least twice.

Because many parcels of land are small, plant protection products were largely applied by knapsack, with 70% of all applications being made in this way, though tractor-mounted spraying equipment was used to make 47% of all plant protection products applications to wheat, 35% to outdoor tomatoes and 31% to watermelons.

Seasonality of plant protection products use was typical of that which might be expected of a Mediterranean climate, with herbicide applications beginning in October at the start of the rainy season when weed seeds begin to germinate, rising to a peak in January, with negligible use from April to September when dry conditions retard weed growth. Although fungicide use occurred throughout the year, the main period of application was from January to June, peaking in May, while insecticide use rose steadily from February to a maximum in June, with lowest use over the period August to November.

A large proportion of crops were grown under artificial irrigation, with around 95% or more of the total area grown of cabbages, carrots, cauliflowers, lettuce, nectarines, strawberries and glasshouse tomatoes being irrigated. Crops not usually grown under irrigation included wheat, onions and broad beans.

In most cases, use of irrigation marginally increased the likelihood of crops requiring plant protection products treatment, the only exceptions being insecticide use on strawberries, outdoor tomatoes and watermelons, where higher humidities may have discouraged development of pests such as mites.

While little comparable data are available from most European countries, in general plant protection products usage in Malta was low in comparison to other southern European countries or the United Kingdom. Indeed, a larger proportion of many crops was grown without and plant protection products input in Malta than in the UK.

Introduction

Plant protection products have been used in the agricultural sector for a number of years. Environmental pressures are on the increase and there is a growing awareness among the general public to monitor their usage.

Pressures on demand for greater agricultural production have, perhaps, brought about greater use of plant protection products. This exercise is intended to quantify usage in Maltese agricultural practices. All Plant Protection Products are imported.

Background

Lack of accurate data concerning plant protection products use is generally recognised as the most important obstacle to measuring the risks linked to plant protection products. This applies particularly to the risks for the environment. Measurements of risks related to the use of plant protection products need appropriate indicators and therefore, Member States, the Commission and the OECD, conducted preliminary studies for their establishment. In this context, experts have expressed their concerns about the accessibility, the transparency, the adequacy and the reliability of data on plant protection products use.

In Decision 1600/2002/EC adopting the 6th Environment Action Programme (6EAP), the European Parliament (EP) and the Council recognised that the impact of plant protection products on human health and the environment and in particular by those used in agriculture, must be reduced further. They underlined the need to achieve a more sustainable use of plant protection products and called for a significant overall reduction in the use of plant protection products and the associated risks, consistent with that necessary for crop protection. In its Communication to the Council, the EP and the Economic and Social Committee (EESC) entitled 'Towards a Thematic Strategy on the Sustainable Use of Pesticides' (COM (2002)349 final), the Commission clearly recognised the need for detailed, harmonized and up-to-date statistics on sales and use of plant protection products at EU level and proposed to establish relevant mandatory requirements within two years of the adoption of the Thematic Strategy for the reinforcement of ongoing work on the collection of data concerning plant protection products use.

Until now, only statistics on plant protection products imported into the country have been collated. As Malta has no indigenous production of plant protection products, this should give reasonable figures on the amounts likely to be used. However, the statistics are rendered less accurate because they comprise a mixture of net and gross weights of imports, sometimes including packaging. Furthermore, even if accurate figures could be compiled on the actual amounts of product imported, this would give no indication of whether or not they were actually used in the year of importation, where they were used, on what crop or at what dose or frequency of application.

A pilot project to develop the structural indicators of plant protection products consumption was initiated under a multi-beneficiary Phare programme of 2002 “Management of pilot projects for a multi-beneficiary statistics programme”. The pilot project was initially commissioned by the EC – Eurostat. However, the NSO rapidly realised the importance of such data and decided to conduct a full survey of plant protection products use on Malta and Gozo, rather than a pilot project for a single district, as was originally commissioned by EUROSTAT.

Only a few Member States collect usage data systematically or have recorded it on a regular basis and the methodology used by the UK, and broadly outlined by Thomas (1999) was adopted for this purpose.

Purpose of the survey

The survey was conducted to establish baseline information on the amounts of plant protection products used during the production of Malta's most important crops. Such information is vital if potential risks to consumers, workers and the environment are to be monitored with the aim of reducing them, as outlined in the aforementioned Thematic Strategy.

The survey aimed to establish the extent of plant protection products use on each crop through a fully stratified sample of growers to establish:

1. the proportion of the crop receiving plant protection product treatments,
2. the number of times crops were treated with each plant protection product,
3. the seasonality of plant protection products use,
4. methods of application,
5. the range and types of plant protection products applied.

Having established this baseline information, future surveys will be able to monitor what changes have taken place and whether improvements in plant protection products practice, and subsequent reductions in risks, are occurring over time.

Launching of the Project

The first contact on the subject was made during the April 2005 Working Party meeting, which was held in Luxembourg. Dr. Miles Thomas, from the UK Department for Environment, Food and Rural Affairs, was commissioned to be the project leader of the whole exercise. The Agriculture and Fisheries Unit made a set of meetings with the Plant protection products Control Section within the Ministry of Rural Affairs and the Environment in order to explore and integrate the available data. A questionnaire to cover EU requisites was designed.

Personnel, from the Ministry of Agriculture and Rural Affairs, with a sound background in this field, were selected to act as enumerators and briefed to carry out the survey on the selected farmers.

Farmers were informed by mail and eventually were interviewed individually by the enumerators. Enumeration started in the first week of June 2005 and was concluded by the end of September 2005.

Training of interviewers

A total of eleven (11) interviewers were responsible for the data collection from the farmers. Enumeration started in the first week of June 2005 and was concluded by the end of September 2005. The survey period covered the crop year from October 2004 to September 2005. Enumerators were provided with a list of plant protection products which were imported into Malta so as to serve as a guideline and facilitate the data collection.

Scope of survey

The urgent need for complete, reliable and comparable statistics on plant protection products use at EU level will help the Commission to implement and prepare an EU policy. Malta does not manufacture any plant protection products (PPPs) and all are imported.

Records on the importation of PPPs are kept by the 'International Trade Section' but are only kept at CN Code level and by Chemical Group. The net weight by CN Code is also available. However, this does not reflect the usage on particular crops, hence, the necessity to carry out a survey is essential. There are only a handful of importers who are involved in plant protection products trade.

The NSO decided to carry out a full-scale sample survey on the most popular crops which are grown on the Maltese Islands. These crops cover 80 per cent of the total crop production during the period covered by the report.

As no thresholds were applied, all holdings were obliged to take an active part in the Census. This enabled the AFU to have full coverage of the agricultural situation, both from a horticultural perspective and also from animal husbandry, in Malta and Gozo.

The structure of the agricultural holdings was explained in detail and at time of extrapolation, there were a total of 11,711 agricultural holdings. It was decided to set a threshold on the number of agricultural holdings that would be represented by the survey at those over 0.50 ha. This indicated that the total number of agricultural holdings with a utilised agricultural area (UAA) of at least 0.50 ha amounted to 5,446. These holdings covered 8,281 ha of UAA, which

represented 85.8% of the total UAA. Small areas of agricultural land are generally not used for commercial purposes, hence, usage of PPP on these land areas may be considered as being negligible. Setting a threshold of less than 0.5 ha of UAA, resulted in 6,265 holdings not being considered for the survey. These holdings covered 1,375 ha of UAA with an average UAA of 0.2 ha per holding.

The holdings in the sample were distributed according to district and size class of UAA and split as follows:-

Gozo and Comino
- Gozo and Comino

Northern region
- Northern district

Central region
- Western district
- Northern harbour district

Southern region
- South eastern district
- Southern harbour district

Apart from stratifying by region, the size class of utilized agricultural area was also taken into consideration. Stratifying by region and size class of UAA is important in order to increase precision estimates from the sample. Whereas, the northern region and the western region focus on the production of horticultural products, the southern region is mainly focused on the production of potatoes and fodder. On the other hand, crop production in Gozo and Comino is mainly on fodder, potatoes, tomatoes, beans, and melons.

The distribution of the population of agricultural holdings that were covered by the survey is given in Table 1 (below). A striking feature about Maltese agriculture is that the majority of agricultural holdings above the threshold are still relatively small, illustrated in Table 1 and Chart 1. In fact, 47.1 per cent of the target population have a holding size of between 0.5 ha and 1 ha of UAA. Only 0.3 per cent of the target population can be considered as very large holdings, having more than 10 ha of UAA per holding. On the other hand, there are 1,755 holdings with a UAA between 1 and 2 ha and 1,106 agricultural holdings with a UAA between 2 and 10 ha.

The distribution of the UAA in Malta is somewhat different and is illustrated in Table 2 and Chart 2. 45.2 per cent of the UAA above the threshold is accounted for by the 1,106 holdings between 2 and 10 ha each. The lowest size group, although accounting for the largest proportion of holdings by number, account for only 21.8 per cent of UAA above the threshold applied.

TABLE 1. REGIONAL DISTRIBUTION OF AGRICULTURAL HOLDINGS BY SIZE CLASS OF UAA (HA) – NUMBER OF HOLDINGS

Region	Size class of UAA (ha)				
	≥ 0.5 - < 1	≥ 1 - < 2	≥ 2 - < 10	≥ 10	TOTAL
Northern	482	410	354	3	**1,249**
Central	803	579	407	4	**1,793**
Southern	748	475	213	3	**1,439**
Gozo & Comino	534	291	132	8	**965**
TOTAL	**2,567**	**1,755**	**1,106**	**18**	**5,446**
% of Total	**47.1**	**32.2**	**20.3**	**0.3**	**100.0**

Chart 1: Percentage distribution of agricultural holdings by size class of UAA (ha)

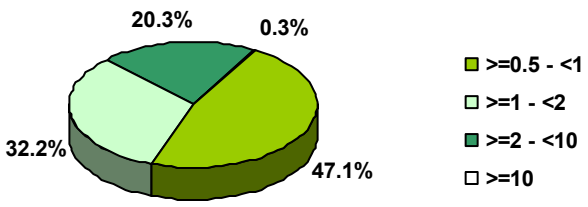

TABLE 2. REGIONAL DISTRIBUTION OF AGRICULTURAL HOLDINGS BY SIZE CLASS OF UAA (HA) – AREA OF HOLDINGS (HA)

Region	Size class of UAA (ha)				
	≥ 0.5 - < 1	≥ 1 - < 2	≥ 2 - < 10	≥ 10	TOTAL
Northern	343	572	1,242	46	**2,203**
Central	567	792	1,367	94	**2,821**
Southern	525	644	686	38	**1,893**
Gozo & Comino	370	401	450	142	**1,363**
TOTAL	**1,805**	**2,409**	**3,745**	**320**	**8,280**
% of Total	**21.8**	**29.1**	**45.2**	**3.9**	**100.0**

Chart 2: Distribution of UAA by size class of UAA (ha)

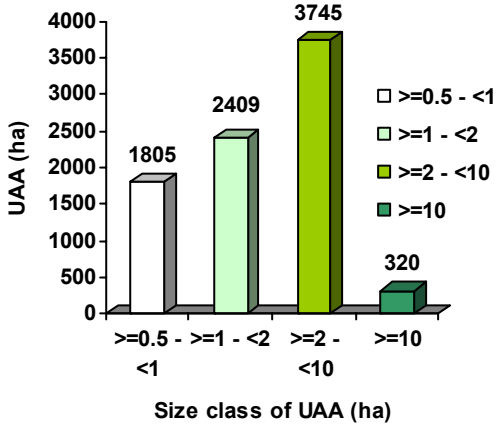

TABLE 3. INITIAL SAMPLE DISTRIBUTION OF HOLDINGS BY SIZE CLASS OF UAA (HA) BY REGION

Region	Size class of UAA (ha)				
	≥ 0.5 - < 1	≥ 1 - < 2	≥ 2 - < 10	≥ 10	TOTAL
Northern	33	33	52	3	**121**
Central	33	33	57	4	**127**
Southern	33	33	33	3	**102**
Gozo & Comino	33	33	33	8	**107**
Total	**132**	**132**	**175**	**18**	**457**

TABLE 4. FINAL SAMPLE DISTRIBUTION OF HOLDINGS BY SIZE CLASS OF UAA (HA) BY REGION

Region	Size class of UAA (ha)				
	≥ 0.5 - < 1	≥ 1 - < 2	≥ 2 - < 10	≥ 10	TOTAL
Northern	33	33	52	3	**121**
Central	33	31	56	4	**124**
Southern	32	31	31	3	**97**
Gozo & Comino	33	32	33	8	**106**
TOTAL	**131**	**127**	**172**	**18**	**448**

TABLE 5. Weighting structure of holdings by size class of UAA (HA) by region

Region	Size class of UAA (ha)			
	≥ 0.5 - < 1	≥ 1 - < 2	≥ 2 - < 10	≥ 10
Northern	14.606	12.424	6.808	1.000
Central	24.333	18.677	7.268	1.000
Southern	23.375	15.323	6.871	1.000
Gozo & Comino	16.182	9.094	4.000	1.000

Holdings with a UAA greater or equal to 10 ha were exhaustively surveyed, thus having a weighting factor of 1 (Table 5). It was imperative that these holdings participate in the survey due to their size. The majority of the holdings in the target population are relatively small. In fact, out of a target population of 5,446 agricultural holdings, 2,567 had a UAA between 0.5 and 1 ha. Due to the small sample size the weighting factors increase where the holding size gets smaller. The initial sample size amounted to 457 agricultural holdings with replacement. In order to maintain the target sample of 457, if an enumerator was not able to trace that specific farmer, that farmer was replaced with another farmer within the same stratum so long as this person had registered his land with the IACS department. When a holding could not longer be replaced, the weights were adjusted with the formula below.

$$W_{adj/h} = W_h \times \left(\frac{n_h}{n_h - r_h} \right)$$

where:

$W_{adj/h}$ is the adjusted weight of stratum h
W_h is the initial sample weight of stratum h
n_h is the number of holdings in the sampled stratum h
r_h is the number of non-response holdings within stratum h

A total of 448 agricultural holdings were surveyed and this represented a response rate of over 98.0 per cent.

The sample was structured in such a way that any selected holdings had a corresponding list of site plans from when the farmer registered his land with the IACS department. With the aid of site plans the farmer could explain exactly the use of PPP for each crop within each parcel, thus reducing the workload of the enumerator.

Each site plan has a unique number and the enumerator was instructed to list all the details of all the crops grown within that particular parcel of land. This was known as the primary stage.

The secondary stage is where the enumerator asks the farmer on each individual crop, the area sown, the area of the crop that was treated, the time of sowing, the time of harvest, and the number of times that the farmer used a PPP on that particular crop within that particular plot of land. The farmer was also asked what type of application was used, and for each application the product name and its application rate. The farmer was also asked in what volume of water the PPP was applied where appropriate.

A correction factor was applied to allow for any slight over- or under-sampling of individual crops during the survey. This was calculated from the estimated national area of each crop, derived from the sum of the area samples multiplied by the first raising factor, divided by the known area of crop grown from the 2001 National census:

$$\text{Correction factor}_c = \sum(a_h * W_{adj/}) / k_c$$

where:

c = crop
a = area of crop sampled in stratum h
$W_{adj/}$ = is the adjusted weighting factor of stratum h
k = national census area for crop c

National estimates were derived by multiplying all sampled factors by their appropriate weighting factor and correction factor.

Selection of crops

One of the aims of the exercise was to ascertain the most important crops to be surveyed with regard to usage of PPPs in Malta.

The selection of crops was based mainly on the most important horticultural crops as listed in Table 6.

Agricultural crops with a low intensity of usage such as fodder, green beans and potatoes were surveyed, as these are the most commonly grown. Crops with a low intensity usage and a low coverage area, such as plums, were excluded as the overall impact of PPP use would be negligible.

Table 6 gives lists the total area to be surveyed in relation to the area under the different crops, as established in the Census of Agriculture 2001.

Broad beans, onions, potatoes and citrus fruits have a relatively lower coverage, as a percentage of census area, as these four crops are widely grown in kitchen gardens. Similarly small parcels of land in which fodder is grown may be rented out to livestock breeders.

TABLE 6. AREA OF CROPS GROWN, AREAS GROWN ON HOLDINGS ABOVE THRESHOLD AND EXPECTED INTENSITY OF PLANT PROTECTION PRODUCTS USE

Crop	Area coverage from Census above threshold	Area - Census of Agriculture 2001	% Coverage	Expected intensity of PPP use
Broad Beans	251.2	358.3	70.1%	Low
Cabbages	84.2	86.7	97.1%	Low
Carrots	58.3	62.9	92.7%	Low
Cauliflowers	180.6	195.3	92.5%	Low
Peas	22.9			Low
Vegetable Marrows	206.1	224.0	92.0%	High
Sugar Melons	196.9	213.6	92.2%	High
Water Melons	109.1	113.5	96.1%	High
Onions	237.8	324.0	73.4%	Low
Potatoes	899.7	1153.5	78.0%	High
Tomatoes -outdoor	311.6	351.7	88.6%	High
Lettuce	61.9	86.0	72.0%	High
Strawberries	19.0	19.4	97.9%	High
Tomatoes – glasshouse	14.8			High
Grapes	394.3	481.7	81.9%	High
Citrus Fruit	62.2	83.6	74.4%	High
Plums	10.1			Low
Peaches	135.7	152.6	88.9%	High
Nectarines	19.4			High
Olives	19.9			High
Fodder	3783.6	4464.4	84.8%	Low

Collection of data

Data were immediately vetted after the interviewing stage. Any queries were referred back to the farmer for clarification. All the data were then inputted when the last questionnaire was compiled.

An in-house program was written by the IT team within the National Statistics Office.

A second visit by the project leader, Dr. Miles Thomas, was set for 10th to the 13th October 2005, where all data were validated and analyzed.

The Agriculture and Fisheries Unit obtained a full list of all products imported into Malta prior Malta's accession into the EU. The Ministry of Agriculture was in full control of all trade with regards to Plant Protection Products and it was imperative to licence any product coming into Malta.

A copy of the questionnaire is attached in the Annexe.

RESULTS

Area of crops treated

Estimates of the basic treated area of each crop on holdings above the 0.5 ha threshold are given in Tables 7a & 7b, along with the estimated area of crop grown nationally on these holdings. The basic treated area is independent of the number of times a crop may have been treated and is best described as the area grown excluding the area receiving no plant protection products treatment, or, for each plant protection products group (fungicide, herbicide, insecticide etc.), the area grown excluding the area not treated with that particular plant protection products group. Thus, the importance of plant protection products use on any particular crop, independent of the area grown, may be illustrated by the percentage of the area grown that was treated by any plant protection products or individual plant protection products groups, as given in Tables 8a & 8b.

From these tables it can be seen that, while wheat, because of the large area grown, accounts for the largest area of treatment at over 1,600 treated ha (Table 7b), it was not the most extensively treated crop, with 57% of the area grown receiving no plant protection products treatment at all (Table 8b).

Considering any plant protection products treatment, the most extensively treated crops, where no untreated crops were encountered in the survey, were nectarines, though applications were restricted to insecticides, glasshouse-grown tomatoes and peas (though only a limited area of peas was surveyed). Other crops where the majority of the crop was treated were strawberries (98% treated), potatoes and carrots (95% treated) and peaches (88% treated). Crops receiving the least level of treatment included broad beans (39% treated), olives (36% treated), wheat (43% treated) and citrus (56% treated). However, these figures do not necessarily reflect the intensity or range of treatment on various crops. For example, where treated, wheat almost invariably received only a single treatment with a herbicide, whereas 82% of the area of grapes grown was treated with fungicides, while 42% received insecticides and 5% was treated with herbicides.

Fungicides were generally the most widely used plant protection products group, being the dominant plant protection products used on broad beans, carrots, grapes, lettuce, onions, potatoes, melons, tomatoes and marrows. However, insecticides were more widely used than fungicides on cabbages, cauliflowers, citrus, nectarines, olives and peaches. Apart from herbicides, all other plant protection products groups were used very infrequently. Acaricide use was only encountered on grapes, strawberries, melons and tomatoes, though use on strawberries was important, with 33% of the crop receiving treatment. Use of Biological products was only encountered on a very limited area of citrus (< 1% of area grown). Molluscicide, nematicide and repellent use was also very limited but soil sterilants were used before planting for 12% of the strawberry area grown and for 3% of glasshouse tomatoes.

Intensity of treatment

Intensity of treatment that is the number of times a crop was treated where a plant protection a product was used is illustrated in Tables 9a & 9b. Thus, although only 24% of the broad bean area received fungicide treatment, where they were used they were applied, on average, 2.5 times (Table 9a, i.e. most crops received either two or three treatments).

The importance of considering this table in the light of the proportion of crop treated is illustrated particularly in the case of acaricide use on grapes and peaches. Where an acaricide was used, on average, grapes were treated five times (Table 9a), while peaches were treated four times (Table 9b), but Tables 8a & 8b show that only 1% of grapes and 2% of peaches were actually treated with acaricides.

Thus, taking into account only uses where over 50% of the crop was treated with a particular plant protection products group, usage was most intense for fungicide use on glasshouse-grown tomatoes (an average of 8.3 treatments per treated crop), grapes (5.8), strawberries (4.1) potatoes (3.7) and onions (3.6). Insecticide use was most intense on outdoor tomatoes (an average of 3.1 treatments per treated crop), peaches and strawberries (2.7 each), cauliflowers (2.6) and cabbages (2.3).

Comparison of usage in Malta with other countries

Comparisons with data from similar countries are difficult to obtain as Malta is the first Mediterranean country to undertake a detailed and comprehensive plant protection products usage survey. Recent data are available as part of another EU-PHARE programme from some southern European countries, while comprehensive data on temperate crops are available from the UK. Where such data are compared to usage in Malta, it can be seen that it is generally less intensive or no certainly no higher than in other countries (Table 10).

In almost all cases where data were available, the number of applications made to crops in Malta was lower than the average across other countries. Indeed, even where usage was marginally higher, as, for example, for fungicide use on cabbages or glasshouse-grown tomatoes, it was usually lower than that found in at least one other country.

Methods of application

Many parcels of land on Malta and Gozo are very small and do not lend themselves to plant protection products applications via tractor-driven machinery. Consequently, by far the most important method of applying plant protection products was by knapsack sprayer, accounting for almost 70% of all applications (Table 11). No other methods of application were encountered for lettuce, nectarines or peas, but this was not the most popular method of application for all crops, with just under 50% of all applications on sugar melons and tomatoes being made using a knapsack sprayer.

Tractor-mounted ground sprayers were a popular method of application on wheat (47% of all applications), outdoor tomatoes (35%), watermelons (31%), grapes (29%), cauliflowers (27%) and onions (25%).

Other methods of application infrequently encountered included granular applications, where small granules of plant protection products, such as molluscicide, were either broadcast around or on the crop, or incorporated into the soil after application; dusts such a sulphur, applied directly to the crop; and fumigation, where gaseous plant protection products such as methyl bromide are injected into the soil to sterilise it prior to planting a new crop. A very small amount of plant protection product was also encountered applied via the irrigation system.

Seasonality of plant protection products use

Plant protection products use followed a typical pattern for a Mediterranean climate, with herbicide applications beginning in October at the start of the rainy season when weed seeds begin to germinate, rising to a peak in January, with negligible use from April to September when dry conditions retard weed growth (Chart 3). Although fungicide use occurred throughout the year, the main period of application was from January to June, peaking in May, while insecticide use rose steadily from February to a maximum in June, with lowest use over the period August to November.

Effect of irrigation

A large proportion of crops were grown under irrigation (Tables 13a & 13b), with around 95% or more of the total area grown of cabbages, carrots, cauliflowers, lettuce, nectarines, strawberries and glasshouse tomatoes being artificially irrigated. Crops not usually grown under irrigation included wheat, where less than 1% of the area grown was irrigated, onions (18.5%) and broad beans (20.3%).

In most cases, use of irrigation increased the likelihood of crops requiring plant protection products treatment. For example, plant protection products were exclusively used on irrigated crops of cabbages, carrots, lettuce, nectarines and glasshouse tomatoes, though only small areas of these crops were grown without irrigation. Furthermore, while only 20% of broad bean crops received irrigation, 59% of all herbicide applications, 48% of all fungicide treatments and 26% of all insecticide treatments were made to irrigated crops. However, whether increased plant protection products use was because of increased pest or disease pressure in irrigated crops, or simply because such crops were potentially of higher yield and therefore value, cannot be determined from this survey.

There were few instances where plant protection products use was lower in irrigated than non-irrigated crops, but insecticide use appeared to be marginally lower in irrigated crops of cauliflowers, grapes, sugar melons, tomatoes and watermelons than in non-irrigated crops, while for strawberries the few non-irrigated crops appeared to have an increased requirement for insecticide use, possibly explained by pests such as mites preferring a dry foliar environment.

Usage of the minor plant protection products groups: acaricides, biological control agents, molluscicides, nematicides, repellents and soil sterilants was restricted to irrigated crops.

Volumes of water used for application

In order to apply plant protection products to crops, they are very often dissolved or dispersed in water and applied by spraying onto the crop in order to come directly into contact with the pest or disease affecting it, or the weeds growing in amongst it. Most plant protection products labels stipulate desirable volumes of water in which to apply plant protection products, which will vary according to the crop to be treated, the problem to be tackled and the machinery used to apply the plant protection products (see Methods of application above).

The volumes of water encountered in this survey were variable, generally lying between 200 to 500 litres per ha (Table 14a & 14b), but typical of those used to apply plant protection products by knapsack or as high volume applications to fruit trees. Of the major plant protection products, herbicides were applied in the highest volumes of water, on average across all crops at 436 l/ha, with fungicides on average in 300 l/ha and insecticides at just under 300 l/ha. Very high

volume applications were only encountered for herbicide use on onions, at over 900 l/ha, and for fungicide applications to sugar melons, at over 800 l/ha.

Usage on individual crops

Broad beans

Although only 24% of the crop was treated with fungicides, a range of different formulations was applied, dominated by products containing mancozeb or other dithiocarbamates, which comprised 80% of the total fungicide treated area. On average, crops were treated 2.5 times. Only 20% of the crop was irrigated but 48% of all fungicide sprays were applied to irrigated crops, suggesting irrigation increased the likelihood of disease and thus requirement for fungicide treatment.

Herbicides were very infrequently used during the production of broad beans, with only 6% of the crop receiving treatment, comprising of a single spray. Only two herbicides were encountered: linuron, accounting for 77% of all applications, and trifluralin (23%). Around 60% of the area treated with herbicides was irrigated.

Fifteen percent of the broad bean crop received insecticide treatment, treated crops being sprayed on average twice. Use of malathion dominated insecticide use on broad beans, accounting for two thirds of all insecticide use. Almost three quarters of all treatments were to non-irrigated crops.

Sixty-one percent of the entire crop was grown without the use of any plant protection products.

Cabbages

Fungicide use was relatively low on cabbages, with only 5% of the crop receiving treatment, on average 1.5 times. Over 97% of the crop was irrigated and fungicide treatments were restricted to these crops.

Herbicides were unimportant in cabbage production, with only 2% of the crop receiving a single treatment of trifluralin, again restricted to irrigated crops.

Insecticides were more widely used, with 59% of the crop receiving, on average, 2.3 sprays per season, again restricted to irrigated crops. Permethrin dominated use, accounting for 60% of all sprays, with carbaryl accounting for a further 10%.

Thirty-nine percent of the entire crop was grown without the use of any plant protection products.

Carrots

Fungicides comprised the most important plant protection products use on carrots, with 63% of the crop receiving treatment, on average 1.6 times. Almost all carrots were grown under irrigation and fungicide treatments were restricted to these crops. Procymidone was the most important active substance applied, accounting for 43% of all fungicides, with sulphur accounting for a further 27%. Products containing dithiocarbamates comprised the majority of the rest at 28%.

Herbicide use was restricted to linuron, with 35% of the crop treated on average 1.1 times.

Insecticide use was unimportant on carrots, with only 4% of the crop receiving treatment, though treated crops received on average 1.6 sprays. Permethrin and dimethoate were the only active substances encountered.

Only five percent of the entire crop was grown without the use of plant protection products.

Cauliflowers

Of the brassica crops, fungicide use was more important on cauliflowers than cabbages, with 18% of the crop treated, though most crops only received a single treatment. Usage was dominated by procymidone (56% of all sprays) and benalaxyl/mancozeb (18%). Irrigation was again important in cauliflower production, with 97% of the crop grown with irrigation. Fungicide use was restricted to these crops.

As with cabbages, only 2% of the crop received an herbicide treatment, though over half of these crops were treated twice, as the average number of treatments was 1.7. Trifluralin was, again, the most important herbicide and treatments were restricted to irrigated crops.

Insecticide use was very important in cauliflower production, with almost three quarters of the crop receiving treatment (73%), treated crops receiving an average of 2.6 sprays. A wide range of insecticides was used but the most important were permethrin (33%), imidacloprid (20%), deltamethrin (17%) and chlorpyrifos-methyl/cypermethrin (11%).

However, one quarter of the entire crop was grown without the use of plant protection products.

Citrus crops

Fungicide use was not as important on citrus crops as many other crops grown in Malta, with only 12% of the area grown being treated and receiving, on average, 1.5 sprays. Products containing dithiocarbamates dominated use (78% of all sprays), with straight mancozeb being the most important. The only other fungicides encountered were copper based. Almost 90% of the crop was grown under irrigation, with fungicide treatments restricted to these crops.

No herbicide use was encountered around surveyed citrus trees.

Just over half (53%) of the crop was treated with insecticides, on average just over twice (2.1 times). Only six different insecticides were encountered, the most important being dimethoate, accounting for 56% of all sprays. Other important insecticides included deltamethrin (23%) and malathion (11%).
Molluscicide use was higher on this crop than any other surveyed, with 10% of the crop receiving, on average, three applications of metaldehyde, all applications being restricted to irrigated crops.

Forty-four percent of the entire crop was grown without the use of any plant protection products.

Grapes

Acaricides were used on a very small area of grapes, with only 1% of the crop being treated, but treated area received an average of five applications of dicofol.

Fungicides were very important, with 82% of the crop being treated. A very wide range of fungicides was applied, and of the important fungicides presented in Table 15a, only use of iprodione and procymidone were not encountered. The most important fungicide was sulphur, accounting for 19% of all sprays by area and 69% of the total weight of fungicides applied to grapes. Other important fungicides included dinocap/myclobutanil, cymoxanil/mancozeb, mancozeb/metalaxyl and mancozeb each comprising 10% of all fungicide use by area. Indeed, products containing dithiocarbamates comprised 44% of all sprays by area treated. Almost 60% of all vineyards were grown under irrigation, with 66% of all fungicide sprays were applied to irrigated crops.

Herbicides were again used only infrequently in vineyards, with only 5% of the crop being treated. Glufosinate ammonium comprised 92% of all treatments, treated crops receiving 3.1 sprays on average, to provide total weed control around the vines.

Insecticides were applied to 42% of the area of grapes grown, with treated crops receiving an average of 2.6 sprays. Carbaryl (29%), deltamethrin (16%), lufenuron (15%) and chlorpyrifos-methyl (13%) were the most frequently used active substances. Irrigation had little impact on the requirement for insecticide treatment.

A small area of crop (< 1%) was treated with the bird-repellent anthraquinone. Where treated, crops received two sprays and usage was restricted to irrigated crops. Vines comprised the only recorded use of this compound.

Fifteen percent of the entire crop was grown without the use of any plant protection products.

Lettuce

A quarter of all lettuce crops received fungicide treatment, treated crops receiving on average 1.6 sprays. Just over half (51%) of all sprays were mancozeb/metalaxyl, with products containing dithiocarbamates comprising 55% in total. Other important fungicides included chlorothalonil/propamocarb (23%) and penconazole (13%). Almost the entire crop was grown under irrigation (99%) with all plant protection products treatments restricted to these crops.

Herbicide use was restricted to trifluralin, with only 2% of the crop receiving a single treatment.

Insecticide use was even less, with only 1% of the crop being treated. Chlorpyrifos-methyl/cypermethrin was the only formulation encountered, with treated crops receiving a single spray.

A very small area was also treated with molluscicides (1%), with treated crops receiving, on average, two applications of metaldehyde.

Seventy-one percent of the entire crop was grown without the use of any plant protection products.

Nectarines

Plant protection products treatments to nectarines were restricted on surveyed crops to insecticides, with the entire area surveyed being treated: once with dimethoate and once with malathion. No surveyed crops were grown without irrigation.

No surveyed crops were grown without the use of plant protection products.

Olives

Olives accounted for the only recorded use of the biological plant protection products *Bacillus thuringiensis*, but less than one percent of the crop was treated, receiving an average of two treatments. Although only 60% of the crop was grown under irrigation, plant protection products use was strongly influenced by this, with all biological plant protection products, 85% of fungicides and 89% of insecticides being applied to irrigated crops.

Fungicides were used infrequently, with only 4% of the crop being treated, though where used, crops were treated on average 2.2 times with either benalaxyl/mancozeb (85% of all treatments) or dinocap (15%). No use of other fungicides was encountered on olives.

No herbicide treatments were applied to surveyed crops.

Insecticides were the most important plant protection products used on olives, with 31% of the area grown receiving treatment, with treated crops receiving, on average, 2.3 sprays. The most important compounds were dimethoate (67% of all sprays) and deltamethrin (23%).

Sixty-four percent of the entire crop was grown without the use of any plant protection products.

Onions

Fungicide use was very important in the production of onions, with three quarters of all crops being sprayed, receiving, on average, 3.6 treatments. A wide range of different fungicides was applied to onions, though products containing dithiocarbamates accounted for two thirds of all use, with mancozeb (26%), mancozeb/metalaxyl (16%) and benalaxyl/mancozeb (14%) being the most important. Onions are an important crop which grows well without the aid of irrigation in Malta. Only 18.5% of the crop was irrigated, applications of fungicides to irrigated crops accounting for 17.3% of all sprays, indicating that disease problems were not noticeably exacerbated by irrigation.

Just over one quarter (26%) of all crops received a single treatment with herbicide, the most important being trifluralin (66% of all sprays) and linuron (22%). Herbicide treatments to irrigated crops accounted for 21% of all herbicide sprays, suggesting, as might be expected, a slightly higher weed problem in irrigated than non-irrigated crops.

Only 2% of all onion crops received insecticide treatments, but these crops were treated on average 2.3 times. The most important insecticides were deltamethrin (37% of all sprays), malathion (16%) and carbaryl (15%).

Twenty-four percent of the entire crop was grown without the use of any plant protection products.

Peaches

Just over half (53%) of the peach crop was grown under irrigation.

Only a small area of peach crops was treated with acaricides, with only 2% of the area grown receiving treatment. Where treated, crops received on average four sprays of acrinathrin, and treatments were restricted to irrigated crops.

Just under half the crop, at 46%, was treated with fungicides, treated crops receiving on average 1.9 applications. Products containing dithiocarbamates accounted for two thirds of all sprays, the most popular formulation being ziram, also used as a repellent. Copper-based compounds were also used, with Copper oxychloride accounting for 19% of the fungicide-treated area. Fungicide applications were slightly more frequently used on irrigated than non-irrigated crops, with 58% of all applications being made to the irrigated crop.

As with many orchard crops in Malta, herbicide use was minimal, with only 3% of the crop being treated. Where applied, applications comprised almost 2 (average 1.9) applications of diquat. Almost all of these treatments (97%) were to irrigated crops.

Insecticide use was very important on peaches and 84% of the crop received treatment, on average insecticides being applied 2.7 times. A range of organophosphate and pyrethroid insecticides were used, the most popular being dimethoate (42% of all sprays), deltamethrin (20%), malathion (14%) and phenthoate (13%). The use of irrigation appeared to increase the requirement for insecticide treatment, with just over two thirds of all treatments being made to irrigated crops.

Twelve percent of the entire crop was grown without the use of any plant protection products.

Peas

Although only a small area of peas was surveyed, the entire surveyed crop received treatment with fungicides and herbicides. None of the surveyed crops were irrigated.

Fungicide treatments were restricted to three formulations: carbendazim (44% of all applications), mancozeb/metalaxyl (33%) and chlorothalonil/propamocarb (22%).

Herbicide use was restricted to a single treatment of trifluralin.

No surveyed crops were grown without the use of plant protection products.

Potatoes

Fungicide use was an integral part of potato production in Malta, as in all European countries, and crops received, on average, 3.7 treatments. As would be expected, dithiocarbamate-containing products dominated use, comprising 80% of the fungicide-treated area. The most popular formulations were mancozeb/metalaxyl (39% of all applications), benalaxyl/mancozeb (16%), and mancozeb alone (14%). Almost three quarters (74%) of the crop was grown under irrigation, though this appeared to increase the requirement for fungicide treatment only marginally, as 20% of all sprays were made to non-irrigated crops.

Although a large area of crop was irrigated, only 12% of the crop was treated with herbicide, though 92% of these applications were made to irrigated crops. Linuron (49% of all treatments), diquat (19%) and trifluralin (16%) were the principal formulations used.

Only 6% of the potato crop was treated with insecticides, suggesting pests were not a serious problem during the growing season. The pyrethroids permethrin (used on 35% of the treated area) and deltamethrin (17%) were the most widely used insecticide group, followed by the organophosphate malathion (21%). The chitin synthesis inhibitor lufenuron was also encountered, applied to 13% of the insecticide-treated area.

Only five percent of the entire crop was grown without the use of any plant protection products.

Strawberries

Acaricide use was more important in strawberry production than any other crop, with 33% of the area grown being treated, on average 2.1 times. Propargite (70% of all treatments) and acrinathrin (30%) were the only acaricides encountered, though several insecticides applied to the crop also have wider acaricidal activity. Irrigation was important in strawberry production, with only 6% of all crops being grown without irrigation. All acaricidal treatments were applied to irrigated crops.

Fungicides were widely used, with 74% of the crop receiving treatment, treated crops receiving, on average, 4.1 sprays. Products containing dithiocarbamates were popular, comprising 44% of all sprays, with mancozeb/metalaxyl (24%), benalaxyl/mancozeb (11%) and mancozeb (8%) being the most important. However, other fungicide groups with completely different modes of action were also encountered, the most important being iprodione (20%), chlorothalonil (9%), chlorothalonil/propamocarb (9%) and cyprodinil/fludioxonil (7%). No fungicide treatments were applied to the very small area of non-irrigated crop.

As with many other crops, herbicides were used only infrequently, with 93% of the crop remaining untreated. Where herbicides were used, only a single spray of trifluralin was applied, treatments being restricted to irrigated crops.

Almost three quarters (73%) of strawberry crops were treated with insecticides, treated crops receiving on average 2.7 applications. The dominant insecticide, abamectin, is also widely used as an acaricide and may well have been applied primarily for mite control, comprising 74% of all insecticide applications. Deltamethrin (9%), malathion (6%) and chlorpyrifos-methyl (4%) were the only other important insecticides encountered.

The soil sterilant chloropicrin/methyl bromide, injected into the ground to control pests, diseases and weeds, was used prior to planting 12% of the crop. Other than a small area under glass prior to planting tomatoes, this was the only use of soil sterilants encountered in this survey.

Only two percent of the entire crop was grown without the use of any plant protection products.

Sugar melons

Only a very small area of sugar melons was treated with acaricides (1% of the area grown), but where used, crops were treated, on average, 3.8 times, usage being limited to acrinathrin (61% of all applications) and propargite (39%). Just over three quarters (77%) of the crop was grown under irrigation, acaricide treatments being restricted to these crops.

Fungicide use was lower than on other cucurbit crops, with 59% of the crop receiving treatment, treated crops receiving, on average, 2.6 sprays. Sulphur, for powdery mildew control, was by far the most important active substance applied, comprising 41% of all fungicide treatments by area and, because of its very high rate of application, 99% of the total weight of fungicides applied to this crop. The dithiocarbamate-containing formulations benalaxyl/mancozeb and mancozeb/metalaxyl comprised 19% and 8% respectively of other fungicide treatments, while specific mildewicides like bupirimate (9%) and penconazole (8%) were also encountered. Irrigation appeared to increase the requirement for fungicide use only marginally, with 81% of all sprays applied to the irrigated crop.

Just under half (46%) of the crop was treated with insecticides, treated crops receiving, on average, two applications. A range of actives with different modes of action was encountered, including thiacloprid (25%), deltamethrin (19%), dimethoate (13%), permethrin (12%), chlorpyrifos-methyl/cypermethrin (11%) and abamectin (10%). Irrigation made no difference to the requirement for insecticide treatment.

Thirty-five percent of the entire crop was grown without the use of any plant protection products.

Tomatoes grown outdoors

Fungicide use on tomatoes was important, with 70% of the crop being treated, treated crops receiving, on average, 3.2 applications. The most important active substance applied was sulphur, accounting for 39% of all treatments by area and 58% by weight applied. Other commonly encountered formulations included mancozeb/metalaxyl and benalaxyl/mancozeb (comprising 16% of the treated area each) and chlorothalonil/propamocarb (7%).

Insecticides were also used on a large proportion of the area grown, with 60% of the crop receiving, on average, 3.1 applications. Lufenuron (36%), chlorpyrifos-methyl/cypermethrin (13%), thiacloprid (13%), deltamethrin (9%) and malathion (6%), accounted for over three quarters of all insecticides applied, illustrating a wide range of modes of action being used on the crop.

Nineteen percent of the entire crop was grown without the use of any plant protection products.

Tomatoes – glasshouse grown

No surveyed crops were untreated with fungicides, treated crops receiving, on average, 8.3 sprays. Products containing dithiocarbamates accounted for less than half of all sprays, but mancozeb/metalaxyl (26%) and benalaxyl/mancozeb (16%) were two of the three most important fungicides used. Penconazole (23%) was the only other major fungicide used, though products containing chlorothalonil accounted for a further 15% of all treatments.

Insecticides were used on almost three quarters (74%) of all crops, treated crops receiving, on average, 1.6 applications. Usage was dominated by deltamethrin (37% of all sprays), pymetrozine (30%) and lufenuron (17%).

The soil sterilant chloropicrin/methyl bromide was used on just 3% of the area grown prior to planting.

No surveyed crops were grown without the use of plant protection products.

Vegetable marrows

As with other cucurbits, fungicide use in vegetable marrows was a major aspect of crop protection, with 73% of the crop being treated. Treated crops received, on average, 3.2 applications. Almost three quarters of all applications were accounted for by three formulations: mancozeb/metalaxyl (29%), sulphur (25%) and penconazole (20%). Because of its very high rates of application, sulphur accounted for 99% of the total weight of fungicides applied to marrows. Four fifths (79%) of all marrows were grown with artificial irrigation, which potentially increased the prevalence of disease as 88% of all fungicide applications were made to irrigated crops.

Almost a quarter (23%) of crops was treated with insecticides, treated crops receiving, on average, 2 applications. A range of different active substances was used, including cypermethrin (24% of all applications), chlorpyrifos (16%), deltamethrin (14%), pymetrozine (10%) and malathion (9%). Insecticide treatment was restricted to irrigated crops.

Damage from slugs or snails was unusual, with only 1% of the crop receiving treatment. Where applied, molluscicides comprised, on average, of two applications of metaldehyde, treatment being restricted to irrigated crops.

Twenty-one percent of the entire crop was grown without the use of any plant protection products.

Watermelons

Watermelons were the only crop, other than strawberries, to receive significant treatment with acaricides. Twelve percent of the crop was treated, treated crops receiving, on average, 1.3 sprays. Two thirds of all sprays were of propargite, the rest being acrinathrin. Around three quarters (76%) of the crop was grown under irrigation and acaricide applications were restricted to these crops.

Fungicides were widely used, with 72% of the crop being treated. Treated crops received, on average, 2.2 applications, with products containing dithiocarbamates being the most important formulations and accounting for 60% of all fungicides used. Mancozeb/metalaxyl was the most important (39% of all applications) with benalaxyl/mancozeb accounting for a further 11%. Use of sulphur was also important, accounting for 24% of the area treated and 98% of the total weight of fungicides applied. Just over 80% of all fungicide applications were made to irrigated crops, illustrating a slightly higher intensity of use than on non-irrigated crops.

Insecticides were applied to 60% of the area grown. Where used, an average of 2.1 applications was made, with deltamethrin and abamectin comprising 29% and 27% of all applications respectively. Abamectin is also widely used as an acaricide and was possibly applied primarily for mite control as acaricide use on this crop was also extensive. Ethofenprox (15% of al applications) and dimethoate (12%) were also important. Seventy percent of all insecticide sprays were to irrigated crops, again illustrating a slightly higher intensity of use than on non-irrigated crops.

Along with sugar melons, watermelons were the only surveyed crop found to be treated with a nematicide. Less than one percent of the area grown received treatment, but, as with sugar melons, this area appeared to be treated three times with oxamyl and was restricted to irrigated crops.

Twenty-two percent of the entire crop was grown without the use of any plant protection products.

Wheat (grown for fodder)

Fungicides were unimportant in the production of wheat as a fodder crop in Malta. Less than 1% of the entire area grown was treated, but where used, crops received two applications, on average, of dithiocarbamate-based compounds, either copper/mancozeb (66% of all applications) or benalaxyl/mancozeb (34%). Less than one percent of the entire area grown was irrigated, fungicide applications being used predominantly on this irrigated area, with only one third of all fungicide sprays being applied to non-irrigated crops.

The only plant protection products of any importance used on wheat were herbicides, with 43% of the area grown receiving treatment, comprising a single application of M.C.P.A for broad-leaved weed control. Use of no other herbicides was encountered.

Fifty-seven percent of the entire crop was grown without the use of any plant protection products.

Usage of individual active substances

Plant protection products may be formulated from a single active substance, as is often the case with insecticides (for example lufenuron), or from two or more active substances, as is frequently found in fungicides (for example cymoxanil/mancozeb/oxadixyl). Thus, active substances that occur in a number of different product formulations, for example mancozeb, may be much more commonly used when considered as individual active substances, than may be obvious from a consideration of such product formulations as presented in Table 15.

Table 18 lists the total area treated by individual active substances for the fifty most commonly encountered by area treated, together with their percentage of all plant protection products use by active substance area treated. Table 19 similarly lists the most used active substances, ranked by weight applied.

In total, use of 82 different active substances was encountered, but most were used very infrequently on limited areas of crop. For example, sixteen active substances (20% of the total) accounted for 80% of the entire active substance treated area, and 59 active substances were applied to less than 1% each of the total treated area. Furthermore, it was estimated that 21 active substances were applied to a total of less than 10 ha of crops each.

By area treated, seven of the most important ten active substances were fungicides, illustrating the importance in crops of disease control over pest or weed control. Because of its frequency of occurrence in many different formulations used on a wide range of crops, the fungicide mancozeb was the most commonly used plant protection products by area treated, comprising 26% of all fungicide treatments. Its use was encountered on all surveyed crops except nectarines, being particularly important on potatoes, grapes and onions.

Only three other active substances were applied to over 1,000 ha of crop: the fungicides metalaxyl and benalaxyl, only available in formulation with mancozeb and used particularly also on potatoes, grapes and onions, and the herbicide M.C.P.A., used exclusively on wheat grown for fodder.

The most important insecticides were the pyrethroids deltamethrin, used predominantly on grapes, cauliflowers and peaches and permethrin, used mainly on cauliflowers, cabbages and potatoes. Although they were the eighth and ninth most used active substances by area treated, they accounted for only 2.3% and 1.7% of the total active substance area treated respectively.

By weight applied, plant protection products use in Malta and Gozo was dominated by sulphur, which accounted for 85% of all plant protection products use by weight (Table 19), primarily because of the very large rates of application used (Table 17). Over 54 tonnes of sulphur was applied to crops, predominantly tomatoes grown outdoors and cucurbits including melons and marrows. Seven of the most important ten plant protection products by weight applied were fungicides, with mancozeb being the most important after sulphur, because of the large area treated, accounting for 6.5% of the total weight. In total, five active substances accounted for 95% of the total weight applied. In addition to sulphur and mancozeb, M.C.P.A., copper sulphate, used mostly on grapes, potatoes and onions, and methyl bromide, restricted to strawberry and glasshouse tomato production, accounted for a further 2.5%, 1% and 0.9% respectively of the total weight applied.

Most plant protection products were only used in small amounts, with an estimated total use in 2004 across both islands of less than 10kg for 46 active substances. The most important ten active substances by weight applied included only one insecticide: Malathion, accounting for only 0.3% of the total weight of plant protection products applied with an estimated total of 190kg.

No use was encountered of organochlorine insecticides.

TABLE 7A. BASIC AREA[1] OF CROPS TREATED WITH PLANT PROTECTION PRODUCTS BY MAJOR PPP GROUP

PPP group	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Acaricide	-	-	-	-	-	3.386	-	-	-	-
Biological product	-	-	-	-	-	-	-	-	0.029	-
Fungicide	60.243	4.318	36.441	33.251	7.232	322.811	15.518	-	0.789	177.921
Herbicide	15.369	1.740	20.140	3.877	-	18.860	1.094	-	-	61.245
Insecticide	36.778	49.679	2.522	131.901	32.967	164.721	0.512	19.443	6.250	5.325
Molluscicide	-	-	-	1.057	5.948	-	0.547	-	-	-
Nematicide	-	-	-	-	-	-	-	-	-	-
Repellent	-	-	-	-	-	5.766	-	-	-	-
Soil sterilant	-	-	-	-	-	-	-	-	-	-
Any PPP	**99.171**	**51.653**	**55.176**	**135.514**	**34.729**	**335.847**	**17.671**	**19.443**	**7.068**	**181.884**
Area Grown	251.290	84.266	58.295	180.582	62.195	394.375	61.879	19.443	19.851	237.816

TABLE 7B. BASIC AREA[1] OF CROPS TREATED WITH PLANT PROTECTION PRODUCTS BY MAJOR PPP GROUP

PPP group	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes - outdoor	Tomatoes-glasshouse	Vegetable-Marrows	Watermelons	Wheat
Acaricide	2.063	-	-	6.377	2.345	3.038	-	-	12.694	-
Biological product	-	-	-	-	-	-	-	-	-	-
Fungicide	62.078	22.945	851.370	14.157	116.530	217.005	14.811	149.732	78.104	2.208
Herbicide	3.436	22.945	107.543	1.405	0.700	3.704	-	2.447	0.358	1,610.444
Insecticide	113.437	-	52.563	13.877	90.773	187.090	11.018	47.800	65.883	-
Molluscicide	-	-	0.363	-	-	-	-	3.047	-	3.513
Nematicide	-	-	-	-	0.700	-	-	-	0.358	-
Repellent	-	-	-	-	-	-	-	-	-	-
Soil sterilant	-	-	-	2.370	-	-	0.450	-	-	-
Any PPP	**119.678**	**22.945**	**853.269**	**18.734**	**127.423**	**253.828**	**14.811**	**161.983**	**85.341**	**1,616.164**
Area Grown	135.694	22.945	899.678	19.045	196.895	311.569	14.811	206.104	109.116	3,783.562

[1]Basic area = the field area of crop receiving treatment, irrespective of the number of times it may have been treated

TABLE 8A. AREA OF CROPS TREATED WITH PLANT PROTECTION PRODUCTS (EXPRESSED AS PERCENTAGE OF THE TOTAL AREA GROWN) BY MAJOR PPP GROUP

PPP group	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Acaricide	-	-	-	-	-	1	-	-	-	-
Biological	-	-	-	-	-	-	-	-	< 1	-
Fungicide	24	5	63	18	12	82	25	-	4	75
Herbicide	6	2	35	2	-	5	2	-	-	26
Insecticide	15	59	4	73	53	42	1	100	31	2
Molluscicide	-	-	-	1	10	-	1	-	-	-
Nematicide	-	-	-	-	-	-	-	-	-	-
Repellent	-	-	-	-	-	1	-	-	-	-
Soil sterilant	-	-	-	-	-	-	-	-	-	-
Any PPP	**39**	**61**	**95**	**75**	**56**	**85**	**29**	**100**	**36**	**76**

TABLE 8B. AREA OF CROPS TREATED WITH PLANT PROTECTION PRODUCTS (EXPRESSED AS PERCENTAGE OF THE TOTAL AREA GROWN) BY MAJOR PPP GROUP

PPP group	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes - outdoor	Tomatoes - glasshouse	Vegetable-Marrows	Watermelons	Wheat
Acaricide	2	-	-	33	1	1	-	-	12	-
Biological product	-	-	-	-	-	-	-	-	-	-
Fungicide	46	100	95	74	59	70	100	73	72	< 1
Herbicide	3	100	12	7	< 1	1	-	1	< 1	43
Insecticide	84	-	6	73	46	60	74	23	60	-
Molluscicide	-	-	< 1	-	-	-	-	1	-	< 1
Nematicide	-	-	-	-	< 1	-	-	-	< 1	-
Repellent	-	-	-	-	-	-	-	-	-	-
Soil sterilant	-	-	-	12	-	-	3	-	-	-
Any PPP	**88**	**100**	**95**	**98**	**65**	**81**	**100**	**79**	**78**	**43**

TABLE 9A. AVERAGE NUMBER OF TREATMENTS APPLIED TO CROPS (WHERE A PLANT PROTECTION PRODUCT WAS USED) BY MAJOR PPP GROUP

PPP group	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Acaricide	-	-	-	-	-	5.0	-	-	-	-
Biological product	-	-	-	-	-	-	-	-	2.0	-
Fungicide	2.5	1.5	1.6	1.2	1.5	5.8	1.6	-	2.2	3.6
Herbicide	1.0	1.0	1.1	1.7	-	3.1	1.0	-	-	1.0
Insecticide	2.0	2.3	1.6	2.6	2.1	2.6	1.0	2.0	2.3	2.3
Molluscicide	-	-	-	2.0	3.0	-	2.0	-	-	-
Nematicide	-	-	-	-	-	-	-	-	-	-
Repellent	-	-	-	-	-	2.0	-	-	-	-
Soil sterilant	-	-	-	-	-	-	-	-	-	-

TABLE 9B. AVERAGE NUMBER OF TREATMENTS APPLIED TO CROPS (WHERE A PLANT PROTECTION PRODUCT WAS USED) BY MAJOR PPP GROUP

PPP group	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes - outdoor	Tomatoes - glasshouse	Vegetable-Marrows	Watermelons	Wheat
Acaricide	4.0	-	-	2.1	3.8	1.0	-	-	1.3	-
Biological product	-	-	-	-	-	-	-	-	-	-
Fungicide	1.9	9.0	3.7	4.1	2.6	3.2	8.3	3.2	2.2	2.0
Herbicide	1.9	1.0	1.0	1.0	1.0	1.0	-	1.0	1.0	1.0
Insecticide	2.7	-	2.0	2.7	2.0	3.1	1.6	2.0	2.1	-
Molluscicide	-	-	2.0	-	-	-	-	2.0	-	2.0
Nematicide	-	-	-	-	3.0	-	-	-	3.0	-
Repellent	-	-	-	-	-	-	-	-	-	-
Soil sterilant	-	-	-	1.0	-	-	1.0	-	-	-

TABLE 10. COMPARISON OF INTENSITY OF PLANT PROTECTION PRODUCTS USE IN OTHER COUNTRIES[1] ON A RANGE OF CROPS

Crop	Malta	Average (other countries)	UK	Romania	Bulgaria	Slovenia
	Fungicide use (times treated)					
Cabbages	1.5	1.4	1.3	1.8	-	1.1
Carrots	1.6	3.2	3.2	-	-	-
Grapes	5.8	8.9	8.9	-	-	-
Strawberries	4.1	5.4	5.4	-	-	-
Onions	3.6	4.4	4.4	-	-	-
Potatoes	3.7	5.5	10.0	2.6	5.2	4.3
Tomatoes - glasshouse	8.3	6.3	5.6	3.4	9.8	-
Tomatoes - outdoor	3.2	6.5		-	6.5	-
	Insecticide use (times treated)					
Cabbages	2.3	2.6	3.1	2.5	-	2.3
Cauliflowers	2.6	2.6	2.6	-	-	-
Tomatoes - outdoor	3.1	4.0	-	3.0	4.9	-
Peaches	2.7	6.1	-		6.1	-
Potatoes	2.0	2.4	1.5	1.9	3.7	-
Strawberries	2.7	1.2	1.2	-	-	-
	Herbicide use (times treated)					
Cabbages	1.0	1.4	1.8	-	-	1.0
Onions	1.0	5.7	5.7	-	-	-
Potatoes	1.0	1.9	2.6	1.4	1.6	-
Wheat	1.0	1.9	3.1	1.2	2.3	1.0

[1]Data for Romania, Bulgaria and Slovenia are from 2004. Data for the UK are from 2004 (potatoes & wheat), 2003 (cabbages, carrots, cauliflowers, onions & tomatoes) or 2001 (grapes & strawberries)

Chart 3. Seasonality of major pesticide use (all crops)

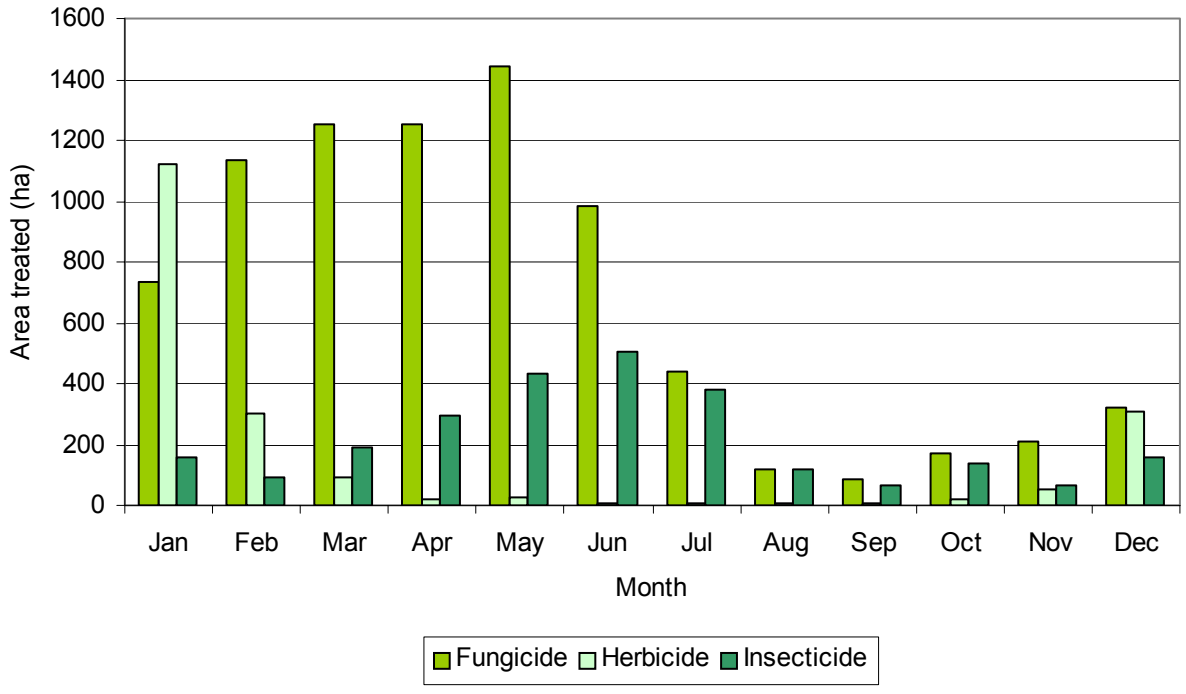

TABLE 11. AREA OF CROPS TREATED WITH DIFFERENT METHODS OF APPLICATION (FORMULATION TREATED HA)

Crop	Dry powder	Granular broadcast	Granular incorporated	Ground sprayer	Applied via irrigation	Knapsack	Soil fumigation
Broad beans	-	-	-	19.246	-	219.194	-
Cabbages	-	-	-	11.305	-	109.205	-
Carrots	2.810	13.103	-	-	-	69.981	-
Cauliflowers	-	-	3.941	104.102	-	279.912	-
Citrus	-	-	35.691	1.479	-	60.220	-
Grapes (quality)	-	20.929	-	700.324	-	1669.845	-
Lettuce	-	-	-	-	-	27.899	-
Nectarines	-	-	-	-	-	38.886	-
Olives	-	-	0.075	2.974	-	13.233	-
Onions	-	1.475	-	174.230	-	530.684	-
Peaches	-	0.123	5.778	103.533	-	331.119	-
Peas	-	-	-	-	-	229.449	-
Potatoes	-	3.582	-	543.428	2.921	2822.399	-
Strawberries	-	-	4.915	-	-	104.655	2.370
Sugar Melons	-	93.803	6.153	159.216	-	241.813	-
Tomatoes - outdoor	64.726	149.662	-	450.078	-	619.033	-
Tomatoes - glasshouse	-	1.258	-	30.704	-	108.864	0.450
Vegetable Marrows	5.313	96.164	-	80.019	-	394.151	-
Water Melons	4.022	34.270	-	102.079	5.506	188.785	-
Wheat	-	-	-	783.539	-	887.689	-
All crops	**76.872**	**414.368**	**56.555**	**3266.256**	**8.427**	**8947.017**	**2.821**
Percentage of all methods	0.6	3.2	0.4	25.6	0.1	70.1	< 0.1

TABLE 12. PLANT PROTECTION PRODUCTS GROUPS: AREA TREATED BY DIFFERENT METHODS OF APPLICATION (FORMULATION TREATED HA)

PPP group	Dry powder	Granular broadcast	Granular incorporated	Ground sprayer	Applied via irrigation	Knapsack	Soil fumigation
Acaricide	-	-	-	25.930	-	41.133	-
Biological product	-	-	-	-	-	0.058	-
Fungicide	76.872	411.818	9.243	1689.595	1.216	5948.607	-
Herbicide	-	-	-	832.698	-	1124.945	-
Insecticide	-	2.550	29.466	706.500	7.211	1812.046	-
Molluscicide	-	-	17.845	-	-	17.053	-
Nematicide	-	-	-	-	-	3.175	-
Repellent	-	-	-	11.533	-	-	-
Soil sterilant	-	-	-	-	-	-	2.821
All crops	**76.872**	**414.368**	**56.555**	**3266.256**	**8.427**	**8947.017**	**2.821**
Percentage of all methods	0.6	3.2	0.4	25.6	0.1	70.1	< 0.1

TABLE 13A. USAGE OF PLANT PROTECTION PRODUCTS ON IRRIGATED CROPS (EXPRESSED AS PERCENTAGE OF THE TOTAL AREA TREATED) BY MAJOR PPP GROUP

PPP group	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Acaricide	-	-	-	-	-	100.0	-	-	-	-
Biological product	-	-	-	-	-	-	-	-	100.0	-
Fungicide	48.4	100.0	100.0	100.0	100.0	66.2	100.0	-	84.6	17.3
Herbicide	59.2	100.0	100.0	100.0	-	99.3	100.0	-	-	20.8
Insecticide	26.4	100.0	100.0	96.6	98.3	55.1	100.0	100.0	88.9	48.5
Molluscicide	-	-	-	100.0	100.0	-	100.0	-	-	-
Nematicide	-	-	-	-	-	-	-	-	-	-
Repellent	-	-	-	-	-	100.0	-	-	-	-
Soil sterilant	-	-	-	-	-	-	-	-	-	-
Irrigated area as % of area grown	20.3	97.4	99.1	97.0	89.2	59.7	98.8	100.0	59.7	18.5

TABLE 13B. USAGE OF PLANT PROTECTION PRODUCTS ON IRRIGATED CROPS (EXPRESSED AS PERCENTAGE OF THE TOTAL AREA TREATED) BY MAJOR PPP GROUP

PPP-group	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes - outdoor	Tomatoes - glasshouse	Vegetable-Marrows	Watermelons	Wheat
Acaricide	100.0	-	-	100.0	100.0	100.0	-	-	100.0	-
Biological product	-	-	-	-	-	-	-	-	-	-
Fungicide	58.4	-	80.0	100.0	80.5	88.6	100.0	87.9	80.4	66.1
Herbicide	96.6	-	91.7	100.0	100.0	100.0	-	100.0	100.0	0.6
Insecticide	67.5	-	91.9	59.9	75.4	72.7	100.0	100.0	69.9	-
Molluscicide	-	-	100.0	-	-	-	-	100.0	-	-
Nematicide	-	-	-	-	100.0	-	-	-	100.0	-
Repellent	-	-	-	-	-	-	-	-	-	-
Soil sterilant	-	-	-	100.0	-	-	100.0	-	-	-
Irrigated area as % of area grown	53.4	0.0	73.9	94.8	76.6	82.8	100.0	79.1	75.7	0.6

TABLE 14A. AVERAGE VOLUMES OF WATER USED TO APPLY PLANT PROTECTION PRODUCTS (LITRES/HA)

PPP group	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Acaricide	-	-	-	-	-	78	-	-	-	-
Biological product	-	-	-	-	-	-	-	-	491	-
Fungicide	313	344	238	266	223	188	210	-	293	447
Herbicide	239	304	340	185	-	267	214	-	-	994
Insecticide	315	386	532	328	213	283	268	248	270	245
Nematicide	-	-	-	-	-	-	-	-	-	-
Repellent	-	-	-	-	-	226	-	-	-	-

TABLE 14B. AVERAGE VOLUMES OF WATER USED TO APPLY PLANT PROTECTION PRODUCTS (LITRES/HA)

PPP-group	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes - outdoor	Tomatoes - glasshouse	Vegetable-Marrows	Watermelons	Wheat	All crops
Acaricide		-	-	235	112	204	-	-	348	-	177
Biological product	-	-	-	-	-	-	-	-	-	-	491
Fungicide	240	273	333	339	194	233	550	243	824	399	299
Herbicide	252	615	286	304	268	234	-	575	268	433	436
Insecticide	287	-	209	309	303	274	502	348	230	-	291
Nematicide	-	-	-	-	149	-	-	-	149	-	149
Repellent	-	-	-	-	-	-	-	-	-	-	184

TABLE 15A. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – AREA TREATED (TREATED HA)

	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Fungicides										
Benalaxyl/mancozeb	43.249	-	8.238	7.225	1.136	123.685	1.025	-	1.447	90.566
Bordeaux mixture/copper sulphate	-	-	-	-	-	30.558	-	-	-	-
Bromuconazole	-	-	-	-	-	7.547	-	-	-	-
Bupirimate	-	-	-	-	-	8.300	1.448	-	-	-
Carbendazim	4.201	-	-	-	-	66.699	-	-	-	4.037
Chlorothalonil	1.265	-	-	-	-	1.113	-	-	-	17.049
Chlorothalonil/propamocarb	0.831	-	-	-	-	3.234	5.874	-	-	5.426
Copper	-	-	-	-	-	4.930	-	-	-	-
Copper/mancozeb	-	-	2.381	-	-	18.422	-	-	-	0.445
Copper hydroxide	-	-	-	-	-	16.397	-	-	-	-
Copper oxychloride	0.214	-	1.117	-	1.655	20.404	0.687	-	-	1.746
Copper sulphate	0.944	-	-	2.113	0.691	62.108	-	-	-	29.897
Cymoxanil/mancozeb	23.571	-	6.090	-	0.187	194.712	-	-	-	50.172
Cymoxanil/mancozeb/oxadixyl	-	-	-	-	-	66.675	-	-	-	-
Cyprodinil/fludioxonil	-	-	-	-	-	0.361	-	-	-	2.100
Dinocap	-	-	-	4.806	-	2.099	-	-	0.263	-
Dinocap/myclobutanil	1.893	-	-	-	-	197.394	-	-	-	66.211
Flusilazole	-	-	-	-	-	15.585	-	-	-	-
Folpet/fosetyl-aluminium	7.739	-	-	-	-	97.030	-	-	-	21.290
Iprodione	5.678	-	-	-	-	-	-	-	-	-
Mancozeb	26.987	-	-	-	6.616	181.811	-	-	-	161.585
Mancozeb/metalaxyl	22.565	2.344	-	2.342	-	189.500	12.885	-	-	102.367
Oxadixyl	-	-	-	-	-	22.992	-	-	-	20.778
Penconazole	1.640	-	-	-	-	40.538	3.279	-	-	12.460
Procymidone	-	-	25.425	22.226	-	-	-	-	-	-
Sulphur	-	-	15.913	-	-	365.624	-	-	-	1.543
Triadimenol	-	-	-	-	-	51.072	-	-	-	2.789
Trifloxystrobin	-	-	-	-	-	32.422	-	-	-	-
Triforine	-	-	-	-	-	1.513	-	-	-	21.615
Zineb	4.018	-	-	0.990	-	25.436	-	-	-	16.612
Ziram	1.118	-	-	-	0.594	18.144	-	-	-	0.302
Other[1] fungicides[2]	5.408	3.950	-	-	-	14.195	-	-	-	3.963
All fungicides	**151.321**	**6.293**	**59.164**	**39.701**	**10.878**	**1880.501**	**25.199**	**-**	**1.711**	**632.953**

[1]Throughout all tables, "Other" refers to chemicals grouped together because they were applied to less than 0.1% of the total area treated with plant protection products.

[2]Other fungicides includes chlorothalonil/fenarimol, copper/cymoxanil, copper oxychloride/copper sulphate, copper oxychloride/mancozeb, cymoxanil, cymoxanil/famoxadone, difenoconazole, folpet, myclobutanil, propineb, pyrazophos and sulphur/triadimenol

TABLE 15B. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – AREA TREATED (TREATED HA)

	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes-outdoor	Tomatoes-glasshouse	Vegetable-Marrows	Water melons	Wheat	All crops
Fungicides											
Benalaxyl/mancozeb	4.748	-	502.570	6.388	58.381	111.098	20.183	22.734	18.627	1.496	1022.796
Bordeaux mixture/copper sulphate	-	-	-	-	-	-	-	-	-	-	30.558
Bromuconazole	-	-	-	-	-	11.571	-	23.233	-	-	42.352
Bupirimate	8.252	-	-	-	26.513	-	-	3.768	5.739	-	54.020
Carbendazim	-	91.779	-	1.405	0.417	22.035	8.243	9.957	3.117	-	211.891
Chlorothalonil	-	-	76.676	5.354	10.914	8.556	7.809	6.990	7.771	-	143.497
Chlorothalonil/propamocarb	0.246	45.890	175.337	5.054	4.632	46.930	10.739	-	2.635	-	306.829
Copper	-	-	43.693	-	-	-	-	-	-	-	48.623
Copper/mancozeb	-	-	24.332	-	-	0.511	-	-	-	2.920	49.011
Copper hydroxide	-	-	-	-	-	-	-	-	-	-	16.397
Copper oxychloride	22.482	-	46.974	-	1.109	-	-	0.625	1.038	-	98.051
Copper sulphate	5.943	-	48.820	-	-	-	-	-	-	-	150.517
Cymoxanil/mancozeb	7.408	-	231.439	0.553	8.414	42.325	0.140	13.449	11.047	-	589.507
Cymoxanil/mancozeb/oxadixyl	-	-	-	-	-	-	-	-	-	-	66.675
Cyprodinil/fludioxonil	-	-	-	3.989	-	-	1.794	6.519	1.645	-	16.408
Dinocap	-	-	1.264	-	4.532	-	-	2.447	-	-	15.412
Dinocap/myclobutanil	-	-	-	-	-	-	-	-	-	-	265.497
Flusilazole	-	-	-	-	-	-	-	-	-	-	15.585
Folpet/fosetyl-aluminium	-	-	120.678	1.672	2.555	8.414	-	3.393	-	-	262.771
Iprodione	-	-	-	11.569	-	-	-	-	-	-	17.247
Mancozeb	1.788	-	432.113	4.555	13.349	18.842	1.974	20.119	7.928	-	877.667
Mancozeb/metalaxyl	1.711	68.835	1249.401	13.911	25.359	113.409	32.135	134.652	67.680	-	2039.095
Oxadixyl	-	-	23.659	1.065	-	4.114	8.386	-	-	-	80.994
Penconazole	0.837	-	21.223	0.553	23.570	15.516	27.991	95.336	3.578	-	246.520
Procymidone	-	-	42.734	-	-	2.780	-	-	-	-	93.165
Sulphur	0.428	-	10.922	-	123.850	266.913	1.258	117.056	42.688	-	946.194
Triadimenol	-	-	-	-	-	11.161	-	-	0.589	-	65.611
Trifloxystrobin	-	-	-	-	-	-	-	-	-	-	32.422
Triforine	-	-	-	-		-	0.168	0.861	-	-	24.157
Zineb	4.325	-	99.613	-	-	-	-	-	-	-	150.994
Ziram	57.364	-	2.735	-	2.108	1.167	-	1.251	0.105	-	84.886
Other[1] fungicides[2]	0.305	-	22.128	1.638	0.209	7.933	2.100	9.288	0.883	-	72.320
All fungicides	**115.835**	**206.504**	**3176.311**	**57.707**	**305.912**	**693.275**	**122.920**	**471.679**	**175.070**	**4.416**	**8137.671**

[1]Throughout all tables, "Other" refers to chemicals grouped together because they were applied to less than 0.1% of the total area treated with plant protection products.

[2]Other fungicides includes chlorothalonil/fenarimol, copper/cymoxanil, copper oxychloride/copper sulphate, copper oxychloride/mancozeb, cymoxanil, cymoxanil/famoxadone, difenoconazole, folpet, myclobutanil, propineb, pyrazophos and sulphur/triadimenol

TABLE 15C. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – AREA TREATED (TREATED HA)

	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Herbicides										
Diquat dibromide	-	-	-	-	-	-	-	-	-	-
Glufosinate ammonium	-	-	-	-	-	54.072	-	-	-	-
Linuron	11.875	-	22.802	-	-	-	-	-	-	13.660
M.C.P.A.	-	-	-	-	-	-	-	-	-	-
Trifluralin	3.494	1.740	-	3.877	-	-	1.094	-	-	40.346
Other herbicides[1]				2.858		4.792				7.085
All herbicides	15.369	1.740	22.802	6.736		58.865	1.094			61.092
Insecticides										
Abamectin	-	-	-	-	-	-	-	-	-	-
Acetamiprid	5.723	-	-	-	-	-	-	-	-	-
Carbaryl	9.231	10.965	-	2.400	-	121.258	-	-	0.591	1.787
Chlorpyrifos	-	8.282	-	11.152	-	4.483	-	-	-	-
Chlorpyrifos-methyl	-	-	-	3.443	-	53.742	-	-	-	-
Chlorpyrifos-methyl/cypermethrin	-	-	-	35.740	-	27.152	0.512	-	-	0.710
Cypermethrin	-	-	-	-	-	-	-	-	-	-
Deltamethrin	4.309	8.800	-	57.545	15.971	68.936	-	-	3.343	4.550
Dimethoate	0.711	0.699	1.117	6.586	38.157	15.164	-	19.443	9.707	-
Ethofenprox	-	-	-	-	-	-	-	-	-	-
Fenitrothion	-	-	-	22.303	-	-	-	-	-	-
Imidacloprid	-	-	-	66.679	1.666	15.156	-	-	-	-
Lufenuron	-	3.701	-	5.642	-	62.832	-	-	-	-
Malathion	48.304	7.934	-	13.686	7.339	13.791	-	19.443	0.599	1.929
Permethrin	2.768	67.420	2.810	113.239	3.560	16.948	-	-	0.274	0.844
Phenthoate	-	-	-	-	1.975	23.808	-	-	-	-
Pymetrozine	-	-	-	-	-	-	-	-	-	-
Thiacloprid	-	-	-	-	-	-	-	-	-	-
Other insecticides[2]	0.704	4.675	-	0.990	-	-	-	-	-	2.523
All insecticides	**71.751**	**112.477**	**3.927**	**339.405**	**68.667**	**423.271**	**0.512**	**38.886**	**14.514**	**12.343**

[1]Other herbicides includes glyphosate, metribuzin, oxyflurofen, pendimethalin, propachlor and terbuthylazine/terbutryn

[2]Other insecticides includes chlorpyrifos/deltamethrin, cyfluthrin, cyfluthrin/imidacloprid, cyromazine, diafenthiuron, indoxacarb, pirimiphos-methyl, profenofos and thiamethoxan

TABLE 15D. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – AREA TREATED (TREATED HA)

	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes-outdoor	Tomatoes-glasshouse	Vegetable-Marrows	Water melons	Wheat	All crops
Herbicides											
Diquat dibromide	6.648	-	17.479	-	-	-	-	-	-	-	24.126
Glufosinate ammonium	-	-	3.102	-	0.700	-	-	-	0.358	-	58.233
Linuron	-	-	44.814	-	-	-	-	2.447	-	-	95.599
M.C.P.A.	-	-	-	-	-	-	-	-	-	1659.786	1659.786
Trifluralin	-	22.945	14.908	1.405	-	2.780	-	-	-	-	92.590
Other herbicides[1]	-	-	11.648	-	-	0.924	-	-	-	-	27.308
All herbicides	**6.648**	**22.945**	**91.951**	**1.405**	**0.700**	**3.704**	**-**	**2.447**	**0.358**	**1659.786**	**1957.642**
Insecticides											
Abamectin	-	-	-	27.680	18.018	11.663	-	6.898	37.808	-	102.066
Acetamiprid	-	-	-	-	3.911	19.227	0.310	-	1.472	-	30.642
Carbaryl	-	-	5.606	-	-	25.649	-	-	-	-	177.488
Chlorpyrifos	3.401	-	-	-	1.402	11.007	-	15.010	-	-	54.738
Chlorpyrifos-methyl	-	-	2.522	1.544	-	6.023	-	3.189	-	-	70.463
Chlorpyrifos-methyl/cypermethrin	19.160	-	-	-	19.634	78.434	-	0.710	-	-	182.053
Cypermethrin	-	-	-	-	-	0.488	-	22.478	-	-	22.965
Deltamethrin	62.865	-	17.969	3.206	34.002	50.709	6.668	13.070	40.385	-	392.329
Dimethoate	129.851	-	1.792	-	24.290	0.254	-	5.097	16.211	-	269.078
Ethofenprox	0.225	-	-	-	8.306	-	0.700	-	21.228	-	30.459
Fenitrothion	-	-	-	-	-	-	-	-	-	-	22.303
Imidacloprid	-	-	-	-	-	23.342	0.243	-	-	-	107.085
Lufenuron	0.416	-	13.645	-	-	210.925	3.000	-	1.645	-	301.808
Malathion	42.361	-	21.433	2.067	6.305	36.446	0.243	8.126	1.075	-	231.083
Permethrin	11.978	-	35.835	0.607	21.067	21.588	-	7.303	0.211	-	306.451
Phenthoate	39.563	-	-	-	-	-	-	-	-	-	65.345
Pymetrozine	-	-	-	-	-	2.817	5.343	9.779	-	-	17.939
Thiacloprid	-	-	-	-	45.635	75.964	-	-	9.172	-	130.771
Other insecticides[2]	-	-	4.539	2.191	0.833	8.948	1.400	3.768	12.136	-	42.708
All insecticides	**309.820**	**-**	**103.340**	**37.296**	**183.403**	**583.484**	**17.906**	**95.427**	**141.343**	**-**	**2557.773**

[1]Other herbicides includes glyphosate, metribuzin, oxyflurofen, pendimethalin, propachlor and terbuthylazine/terbutryn

[2]Other insecticides includes chlorpyrifos/deltamethrin, cyfluthrin, cyfluthrin/imidacloprid, cyromazine, diafenthiuron, indoxacarb, pirimiphos-methyl, profenofos and thiamethoxan

TABLE 15E. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – AREA TREATED (TREATED HA)

	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Acaricides										
Acrinathrin	-	-	-	-	-	-	-	-	-	-
Dicofol	-	-	-	-	-	16.928	-	-	-	-
Propargite	-	-	-	-	-	-	-	-	-	-
Other acaricides[1]	-	-	-	-	-		-	-	-	-
All acaricides	-	-	-	-	-	**16.928**	-	-	-	-
Biological products										
Other biological products[2]	-	-	-	-	-	-	-	-	0.058	-
Molluscicides										
Metaldehyde	-	-	-	2.113	17.845	-	1.094	-	-	-
Nematicides										
Other nematicides[3]	-	-	-	-	-	-	-	-	-	-
Repellents										
Other repellents[4]	-	-	-	-	-	11.533	-	-	-	-
Soil sterilants										
Other soil sterilants[5]	-	-	-	-	-	-	-	-	-	-
All PPPs	**238.441**	**120.510**	**85.894**	**387.955**	**97.390**	**2391.097**	**27.899**	**38.886**	**16.225**	**706.388**

[1]Other acaricides were amitraz

[2]Other biological products were *Bacillus thuringiensis*

[3]Other nematicides were oxamyl

[4]Other repellents were anthraquinone

[5]Other soil sterilants were chlorpicrin/methyl bromide

TABLE 15F. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – AREA TREATED (TREATED HA)

	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes-outdoor	Tomatoes-glasshouse	Vegetable-Marrows	Water melons	Wheat	All crops
Acaricides											
Acrinathrin	8.252	-	-	3.989	5.444	-	-	-	5.739	-	23.424
Dicofol	-	-	-	-	-	-	-	-	-	-	16.928
Propargite	-	-	-	9.173	3.425	0.258	-	-	11.076	-	23.932
Other acaricides[1]	-	-	-	-	-	2.780	-	-	-	-	2.780
All acaricides	**8.252**	**-**	**-**	**13.163**	**8.870**	**3.038**	**-**	**-**	**16.814**	**-**	**67.064**
Biological products											
Other biological products[2]	-	-	-	-	-	-	-	-	-	-	0.058
Molluscicides											
Metaldehyde	-	-	0.727	-	-	-	-	6.093	-	7.026	34.898
Nematicides											
Other nematicides[3]	-	-	-	-	2.100	-	-	-	1.075	-	3.175
Repellents											
Other repellents[4]	-	-	-	-	-	-	-	-	-	-	11.533
Soil sterilants											
Other soil sterilants[5]	-	-	-	2.370	-	-	0.450	-	-	-	2.821
All PPPs	**440.553**	**229.449**	**3372.330**	**111.941**	**500.985**	**1283.500**	**141.276**	**575.647**	**334.662**	**1671.228**	**12772.577**

[1]Other acaricides were amitraz

[2]Other biological products were *Bacillus thuringiensis*

[3]Other nematicides were oxamyl

[4]Other repellents were anthraquinone

[5]Other soil sterilants were chlorpicrin/methyl bromide

TABLE 16A. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – WEIGHT APPLIED (KG ACTIVE SUBSTANCE)

	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Fungicides										
Benalaxyl/mancozeb	33.3	-	14.5	4.2	1.0	132.8	0.6	-	0.8	93.1
Bordeaux mixture/copper sulphate	-	-	-	-	-	20.8	-	-	-	-
Bromuconazole	-	-	-	-	-	0.5	-	-	-	-
Bupirimate	-	-	-	-	-	1.6	0.1	-	-	-
Carbendazim	0.5	-	-	-	-	22.0	-	-	-	0.5
Chlorothalonil	1.4	-	-	-	-	0.1	-	-	-	8.1
Chlorothalonil/propamocarb	0.4	-	-	-	-	0.9	0.3	-	-	1.7
Copper	-	-	-	-	-	3.3	-	-	-	-
Copper/mancozeb	-	-	1.0	-	-	6.5	-	-	-	2.1
Copper hydroxide	-	-	-	-	-	10.3	-	-	-	-
Copper oxychloride	0.6	-	0.1	-	3.0	8.1	0.1	-	-	0.5
Copper sulphate	3.3	-	-	4.2	1.2	151.6	-	-	-	255.0
Cymoxanil/mancozeb	41.4	-	9.7	-	0.6	124.3	-	-	-	217.2
Cymoxanil/mancozeb/oxadixyl	-	-	-	-	-	132.1	-	-	-	-
Cyprodinil/fludioxonil	-	-	-	-	-	0.2	-	-	-	0.4
Dinocap	-	-	-	0.8	-	0.2	-	-	0.1	-
Dinocap/myclobutanil	0.3	-	-	-	-	95.9	-	-	-	32.1
Flusilazole	-	-	-	-	-	0.7	-	-	-	-
Folpet/fosetyl-aluminium	1.9	-	-	-	-	89.1	-	-	-	78.7
Iprodione	2.7	-	-	-	-	-	-	-	-	-
Mancozeb	25.0	-	-	-	0.9	116.6	-	-	-	141.5
Mancozeb/metalaxyl	16.1	1.0	-	1.1	-	152.5	8.3	-	-	99.7
Oxadixyl	-	-	-	-	-	14.5	-	-	-	8.7
Penconazole	0.1	-	-	-	-	1.1	0.1	-	-	1.7
Procymidone	-	-	3.0	4.2	-	-	-	-	-	-
Sulphur	-	-	2759.8	-	-	2484.9	-	-	-	0.5
Triadimenol	-	-	-	-	-	1.3	-	-	-	0.2
Trifloxystrobin	-	-	-	-	-	2.2	-	-	-	-
Triforine	-	-	-	-	-	0.1	-	-	-	1.4
Zineb	1.4	-	-	1.2	-	28.0	-	-	-	46.8
Ziram	1.2	-	-	-	0.9	12.6	-	-	-	0.1
Other[1] fungicides[2]	2.8	1.6	-	-	-	3.0	-	-	-	0.6
All fungicides	**132.3**	**2.6**	**2788.1**	**15.8**	**7.6**	**3617.9**	**9.4**	**-**	**1.0**	**990.4**

[1]Throughout all tables, "Other" refers to chemicals grouped together because they were applied to less than 0.1% of the total area treated with plant protection products.

[2]Other fungicides includes chlorothalonil/fenarimol, copper/cymoxanil, copper oxychloride/copper sulphate, copper oxychloride/mancozeb, cymoxanil, cymoxanil/famoxadone, difenoconazole, folpet, myclobutanil, propineb, pyrazophos and sulphur/triadimenol

TABLE 16B. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – WEIGHT APPLIED (KG ACTIVE SUBSTANCE)

	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes-outdoor	Tomatoes-glasshouse	Vegetable-Marrows	Water melons	Wheat	All crops
Fungicides											
Benalaxyl/mancozeb	19.2	-	473.4	8.3	34.7	72.9	37.8	25.0	10.1	0.6	962.4
Bordeaux mixture/copper sulphate	-	-	-	-	-	-	-	-	-	-	20.8
Bromuconazole	-	-	-	-	-	1.1	-	0.6	-	-	2.1
Bupirimate	0.9	-	-	-	10.4	-	-	0.3	0.4	-	13.6
Carbendazim	-	12.3	-	0.1	0.1	2.0	2.4	3.3	0.5	-	43.7
Chlorothalonil	-	-	28.3	8.7	14.9	4.2	4.4	0.3	3.2	-	73.6
Chlorothalonil/propamocarb	0.1	21.2	63.2	0.4	1.7	9.6	12.1	-	1.1	-	112.6
Copper	-	-	18.4	-	-	-	-	-	-	-	21.7
Copper/mancozeb	-	-	24.2	-	-	0.5	-	-	-	1.3	35.6
Copper hydroxide	-	-	-	-	-	-	-	-	-	-	10.3
Copper oxychloride	7.7	-	53.6	-	0.4	-	-	0.4	0.1	-	74.4
Copper sulphate	16.4	-	171.6	-	-	-	-	-	-	-	603.3
Cymoxanil/mancozeb	1.9	-	193.9	< 0.1	7.7	20.1	0.1	11.2	19.3	-	647.3
Cymoxanil/mancozeb/oxadixyl	-	-	-	-	-	-	-	-	-	-	132.1
Cyprodinil/fludioxonil	-	-	-	0.8	-	-	0.4	1.4	0.3	-	3.5
Dinocap	-	-	0.6	-	1.1	-	-	0.1	-	-	2.9
Dinocap/myclobutanil	-	-	-	-	-	-	-	-	-	-	128.2
Flusilazole	-	-	-	-	-	-	-	-	-	-	0.7
Folpet/fosetyl-aluminium	-	-	144.9	1.0	6.8	231.3	-	20.8	-	-	574.4
Iprodione	-	-	-	2.1	-	-	-	-	-	-	4.8
Mancozeb	1.0	-	398.7	2.1	7.0	5.8	1.1	14.9	4.6	-	719.3
Mancozeb/metalaxyl	0.8	54.2	1485.9	11.7	17.3	92.0	34.0	61.6	53.8	-	2090.0
Oxadixyl	-	-	32.7	0.2	-	8.4	9.1	-	-	-	73.6
Penconazole	< 0.1	-	2.6	< 0.1	1.1	0.4	2.5	4.4	0.1	-	14.1
Procymidone	-	-	12.9	-	-	0.9	-	-	-	-	21.1
Sulphur	22.7	-	430.8	-	8765.2	24195.0	143.3	9991.5	5339.6	-	54133.3
Triadimenol	-	-	-	-	-	1.7	-	-	0.2	-	3.4
Trifloxystrobin	-	-	-	-	-	-	-	-	-	-	2.2
Triforine	-	-	-	-		-	< 0.1	0.8	-	-	2.3
Zineb	3.7	-	211.7	-	-	-	-	-	-	-	292.8
Ziram	87.5	-	3.9	-	0.3	0.2	-	1.1	< 0.1	-	107.8
Other[1] fungicides[2]	0.5	-	5.2	0.4	0.2	1.8	0.1	1.5	0.5	-	18.2
All fungicides	**162.3**	**87.7**	**3756.8**	**36.0**	**8869.0**	**24647.6**	**247.1**	**10139.1**	**5433.7**	**1.9**	**60946.3**

[1]Throughout all tables, "Other" refers to chemicals grouped together because they were applied to less than 0.1% of the total area treated with plant protection products.

[2]Other fungicides includes chlorothalonil/fenarimol, copper/cymoxanil, copper oxychloride/copper sulphate, copper oxychloride/mancozeb, cymoxanil, cymoxanil/famoxadone, difenoconazole, folpet, myclobutanil, propineb, pyrazophos and sulphur/triadimenol

TABLE 16C. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – WEIGHT APPLIED (KG ACTIVE SUBSTANCE)

	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Herbicides										
Diquat dibromide	-	-	-	-	-	-	-	-	-	-
Glufosinate ammonium	-	-	-	-	-	9.3	-	-	-	-
Linuron	6.2	-	8.4	-	-	-	-	-	-	31.5
M.C.P.A.	-	-	-	-	-	-	-	-	-	-
Trifluralin	0.6	0.8	-	0.7	-	-	0.3	-	-	52.3
Other herbicides[1]	-	-	-	< 0.1	-	2.3	-	-	-	18.8
All herbicides	**6.8**	**0.8**	**8.4**	**0.7**	**-**	**11.6**	**0.3**	**-**	**-**	**102.6**
Insecticides										
Abamectin	-	-	-	-	-	-	-	-	-	-
Acetamiprid	0.2	-	-	-	-	-	-	-	-	-
Carbaryl	6.8	12.5	-	7.1	-	65.7	-	-	0.4	3.4
Chlorpyrifos	-	1.6	-	3.5	-	1.1	-	-	-	-
Chlorpyrifos-methyl	-	-	-	1.1	-	17.6	-	-	-	-
Chlorpyrifos-methyl/cypermethrin	-	-	-	3.1	-	3.3	0.1	-	-	< 0.1
Cypermethrin	-	-	-	-	-	-	-	-	-	-
Deltamethrin	< 0.1	0.1	-	0.4	0.1	1.6	-	-	< 0.1	0.1
Dimethoate	1.5	1.6	0.2	2.0	5.7	1.8	-	2.9	2.1	-
Ethofenprox	-	-	-	-	-	-	-	-	-	-
Fenitrothion	-	-	-	7.1	-	-	-	-	-	-
Imidacloprid	-	-	-	2.5	0.1	0.2	-	-	-	-
Lufenuron	-	0.1	-	0.1	-	1.2	-	-	-	-
Malathion	57.7	2.7	-	11.2	4.2	8.6	-	9.2	0.6	1.5
Permethrin	0.2	3.8	0.5	11.4	0.3	2.0	-	-	< 0.1	0.1
Phenthoate	-	-	-	-	0.2	3.8	-	-	-	-
Pymetrozine	-	-	-	-	-	-	-	-	-	-
Thiacloprid	-	-	-	-	-	-	-	-	-	-
Other insecticides[2]	0.2	5.4	-	0.6	-	-	-	-	-	0.1
All insecticides	**66.6**	**27.8**	**0.7**	**50.2**	**10.6**	**106.9**	**0.1**	**12.1**	**3.2**	**5.0**

[1]Other herbicides includes glyphosate, metribuzin, oxyflurofen, pendimethalin, propachlor and terbuthylazine/terbutryn

[2]Other insecticides includes chlorpyrifos/deltamethrin, cyfluthrin, cyfluthrin/imidacloprid, cyromazine, diafenthiuron, indoxacarb, pirimiphos-methyl, profenofos and thiamethoxan

TABLE 16D. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – WEIGHT APPLIED (KG ACTIVE SUBSTANCE)

	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes-outdoor	Tomatoes-glasshouse	Vegetable-Marrows	Water melons	Wheat	All crops
Herbicides											
Diquat dibromide	0.6	-	6.9	-	-	-	-	-	-	-	7.5
Glufosinate ammonium	-	-	1.1	-	< 0.1	-	-	-	< 0.1	-	10.4
Linuron	-	-	13.7	-	-	-	-	3.6	-	-	63.4
M.C.P.A.	-	-	-	-	-	-	-	-	-	1641.0	1641.0
Trifluralin	-	31.4	3.9	1.1	-	0.3	-	-	-	-	91.4
Other herbicides[1]	-	-	2.0	-	-	0.2	-	-	-	-	23.3
All herbicides	**0.6**	**31.4**	**27.7**	**1.1**	**< 0.1**	**0.5**	**-**	**3.6**	**< 0.1**	**1641.0**	**1837.1**
Insecticides											
Abamectin	-	-	-	0.1	0.2	0.1	-	0.1	0.1	-	0.5
Acetamiprid	-	-	-	-	2.2	1.2	< 0.1	-	0.1	-	3.7
Carbaryl	-	-	3.9	-	-	48.8	-	-	-	-	148.6
Chlorpyrifos	0.6	-	-	-	0.2	1.3	-	2.5	-	-	10.8
Chlorpyrifos-methyl	-	-	0.7	0.6	-	1.3	-	1.6	-	-	22.9
Chlorpyrifos-methyl/cypermethrin	2.0	-	-	-	2.0	16.6	-	0.1	-	-	27.2
Cypermethrin	-	-	-	-	-	0.2	-	1.2	-	-	1.3
Deltamethrin	1.0	-	< 0.1	0.2	0.2	0.5	0.1	0.1	0.7	-	5.1
Dimethoate	28.9	-	2.0	-	16.8	0.1	-	2.4	8.1	-	76.1
Ethofenprox	< 0.1	-	-	-	1.3	-	0.1	-	1.0	-	2.3
Fenitrothion	-	-	-	-	-	-	-	-	-	-	7.1
Imidacloprid	-	-	-	-	-	0.9	0.2	-	-	-	4.0
Lufenuron	< 0.1	-	0.1	-	-	4.5	0.2	-	< 0.1	-	6.3
Malathion	15.0	-	26.1	2.9	3.0	36.3	1.0	4.7	0.5	-	185.1
Permethrin	0.3	-	12.7	0.1	8.4	2.7	-	0.5	< 0.1	-	43.0
Phenthoate	4.5	-	-	-	-	-	-	-	-	-	8.4
Pymetrozine	-	-	-	-	-	0.3	0.5	1.7	-	-	2.5
Thiacloprid	-	-	-	-	7.7	13.8	-	-	1.6	-	23.0
Other insecticides[2]	-	-	1.1	0.7	0.4	2.3	0.1	0.4	1.3	-	12.5
All insecticides	**52.3**	**-**	**46.7**	**4.5**	**42.3**	**130.8**	**2.1**	**15.2**	**13.2**	**-**	**590.2**

[1]Other herbicides includes glyphosate, metribuzin, oxyflurofen, pendimethalin, propachlor and terbuthylazine/terbutryn

[2]Other insecticides includes chlorpyrifos/deltamethrin, cyfluthrin, cyfluthrin/imidacloprid, cyromazine, diafenthiuron, indoxacarb, pirimiphos-methyl, profenofos and thiamethoxan

TABLE 16E. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – WEIGHT APPLIED (KG ACTIVE SUBSTANCE)

	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Acaricides										
Acrinathrin	-	-	-	-	-	-	-	-	-	-
Dicofol	-	-	-	-	-	1.3	-	-	-	-
Propargite	-	-	-	-	-	-	-	-	-	-
Other acaricides[1]	-	-	-	-	-	-	-	-	-	-
All acaricides	**-**	**-**	**-**	**-**	**-**	**1.3**	**-**	**-**	**-**	**-**
Biological products										
Other biological products[2]	-	-	-	-	-	-	-	-	< 0.1	-
Molluscicides										
Metaldehyde	-	-	-	0.3	0.9	-	0.1	-	-	-
Nematicides										
Other nematicides[3]	-	-	-	-	-	-	-	-	-	-
Repellents										
Other repellents[4]	-	-	-	-	-	2.1	-	-	-	-
Soil sterilants										
Other soil sterilants[5]	-	-	-	-	-	-	-	-	-	-
All PPPs	**205.7**	**31.1**	**2,797.2**	**67.0**	**19.2**	**3,739.8**	**9.9**	**12.1**	**4.2**	**1,098.0**

[1]Other acaricides were amitraz

[2]Other biological products were *Bacillus thuringiensis*

[3]Other nematicides were oxamyl

[4]Other repellents were anthraquinone

[5]Other soil sterilants were chlorpicrin/methyl bromide

TABLE 16F. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – WEIGHT APPLIED (KG ACTIVE SUBSTANCE)

	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes-outdoor	Tomatoes-glasshouse	Vegetable-Marrows	Water melons	Wheat	All crops
Acaricides											
Acrinathrin	0.1	-	-	< 0.1	< 0.1	-	-	-	0.1	-	0.2
Dicofol	-	-	-	-	-	-	-	-	-	-	1.3
Propargite	-	-	-	0.7	0.1	< 0.1	-	-	3.5	-	4.3
Other acaricides[1]	-	-	-	-	-	0.1	-	-	-	-	0.1
All acaricides	**0.1**	**-**	**-**	**0.7**	**0.1**	**0.1**	**-**	**-**	**3.5**	**-**	**5.9**
Biological products											
Other biological products[2]	-	-	-	-	-	-	-	-	-	-	< 0.1
Molluscicides											
Metaldehyde	-	-	0.1	-	-	-	-	0.7	-	0.9	2.9
Nematicides											
Other nematicides[3]	-	-	-	-	< 0.1	-	-	-	< 0.1	-	< 0.1
Repellents											
Other repellents[4]	-	-	-	-	-	-	-	-	-	-	2.1
Soil sterilants											
Other soil sterilants[5]	-	-	-	306.1	-	-	268.4	-	-	-	574.4
All PPPs	**215.4**	**119.1**	**3,831.2**	**348.3**	**8,873.7**	**24,779.1**	**517.6**	**10,158.6**	**5,450.5**	**1,643.8**	**63,921.4**

[1]Other acaricides were amitraz

[2]Other biological products were *Bacillus thuringiensis*

[3]Other nematicides were oxamyl

[4]Other repellents were anthraquinone

[5]Other soil sterilants were chlorpicrin/methyl bromide

TABLE 17A. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – AVERAGE RATE OF APPLICATION (KG ACTIVE SUBSTANCE/HA)

	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Fungicides										
Benalaxyl/mancozeb	0.77	-	1.76	0.59	0.90	1.07	0.59	-	0.59	1.03
Bordeaux mixture/copper sulphate	-	-	-	-	-	0.68	-	-	-	-
Bromuconazole	-	-	-	-	-	0.06	-	-	-	-
Bupirimate	-	-	-	-	-	0.19	0.10	-	-	-
Carbendazim	0.12	-	-	-	-	0.33	-	-	-	0.13
Chlorothalonil	1.08	-	-	-	-	0.08	-	-	-	0.47
Chlorothalonil/propamocarb	0.45	-	-	-	-	0.27	0.05	-	-	0.31
Copper	-	-	-	-	-	0.67	-	-	-	-
Copper/mancozeb	-	-	0.41	-	-	0.35	-	-	-	4.73
Copper hydroxide	-	-	-	-	-	0.63	-	-	-	-
Copper oxychloride	3.00	-	0.09	-	1.82	0.40	0.07	-	-	0.26
Copper sulphate	3.45	-	-	1.97	1.77	2.44	-	-	-	8.53
Cymoxanil/mancozeb	1.76	-	1.58	-	3.19	0.64	-	-	-	4.33
Cymoxanil/mancozeb/oxadixyl	-	-	-	-	-	1.98	-	-	-	-
Cyprodinil/fludioxonil	-	-	-	-	-	0.56	-	-	-	0.20
Dinocap	-	-	-	0.16	-	0.09	-	-	0.44	-
Dinocap/myclobutanil	0.14	-	-	-	-	0.49	-	-	-	0.48
Flusilazole	-	-	-	-	-	0.05	-	-	-	-
Folpet/fosetyl-aluminium	0.24	-	-	-	-	0.92	-	-	-	3.70
Iprodione	0.48	-	-	-	-	-	-	-	-	-
Mancozeb	0.93	-	-	-	0.13	0.64	-	-	-	0.88
Mancozeb/metalaxyl	0.71	0.43	-	0.48	-	0.80	0.64	-	-	0.97
Oxadixyl	-	-	-	-	-	0.63	-	-	-	0.42
Penconazole	0.04	-	-	-	-	0.03	0.03	-	-	0.13
Procymidone	-	-	0.12	0.19	-	-	-	-	-	-
Sulphur	-	-	173.43	-	-	6.80	-	-	-	0.36
Triadimenol	-	-	-	-	-	0.02	-	-	-	0.07
Trifloxystrobin	-	-	-	-	-	0.07	-	-	-	-
Triforine	-	-	-	-	-	0.10	-	-	-	0.06
Zineb	0.34	-	-	1.25	-	1.10	-	-	-	2.82
Ziram	1.07	-	-	-	1.49	0.69	-	-	-	0.43

TABLE 17B. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – AVERAGE RATE OF APPLICATION (KG ACTIVE SUBSTANCE/HA)

	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes-outdoor	Tomatoes-glasshouse	Vegetable-Marrows	Water melons	Wheat	All crops
Fungicides											
Benalaxyl/mancozeb	4.04	-	0.94	1.30	0.59	0.66	1.87	1.10	0.54	0.42	0.94
Bordeaux mixture/copper sulphate	-	-	-	-	-	-	-	-	-	-	0.68
Bromuconazole	-	-	-	-	-	0.09	-	0.02	-	-	0.05
Bupirimate	0.10	-	-	-	0.39	-	-	0.07	0.06	-	0.25
Carbendazim	-	0.13	-	0.05	0.24	0.09	0.29	0.33	0.17	-	0.21
Chlorothalonil	-	-	0.37	1.63	1.36	0.49	0.57	0.05	0.42	-	0.51
Chlorothalonil/propamocarb	0.33	0.46	0.36	0.09	0.37	0.20	1.13	-	0.40	-	0.37
Copper	-	-	0.42	-	-	-	-	-	-	-	0.45
Copper/mancozeb	-	-	1.00	-	-	0.95	-	-	-	0.43	0.73
Copper hydroxide	-	-	-	-	-	-	-	-	-	-	0.63
Copper oxychloride	0.34	-	1.14	-	0.32	-	-	0.65	0.08	-	0.76
Copper sulphate	2.76	-	3.52	-	-	-	-	-	-	-	4.01
Cymoxanil/mancozeb	0.25	-	0.84	0.09	0.92	0.47	0.77	0.83	1.75	-	1.10
Cymoxanil/mancozeb/oxadixyl	-	-	-	-	-	-	-	-	-	-	1.98
Cyprodinil/fludioxonil	-	-	-	0.21	-	-	0.20	0.21	0.17	-	0.21
Dinocap	-	-	0.50	-	0.24	-	-	0.06	-	-	0.19
Dinocap/myclobutanil	-	-	-	-	-	-	-	-	-	-	0.48
Flusilazole	-	-	-	-	-	-	-	-	-	-	0.05
Folpet/fosetyl-aluminium	-	-	1.20	0.60	2.68	27.48	-	6.12	-	-	2.19
Iprodione	-	-	-	0.18	-	-	-	-	-	-	0.28
Mancozeb	0.58	-	0.92	0.46	0.53	0.31	0.54	0.74	0.58	-	0.82
Mancozeb/metalaxyl	0.47	0.79	1.19	0.84	0.68	0.81	1.06	0.46	0.80	-	1.02
Oxadixyl	-	-	1.38	0.20	-	2.04	1.08	-	-	-	0.91
Penconazole	0.03	-	0.12	0.07	0.05	0.02	0.09	0.05	0.02	-	0.06
Procymidone	-	-	0.30	-	-	0.33	-	-	-	-	0.23
Sulphur	53.03	-	39.44	-	70.77	90.65	113.87	85.36	125.08	-	57.21
Triadimenol	-	-	-	-	-	0.15	-	-	0.35	-	0.05
Trifloxystrobin	-	-	-	-	-	-	-	-	-	-	0.07
Triforine	-	-	-	-		-	0.06	0.94	-	-	0.10
Zineb	0.86	-	2.13	-	-	-	-	-	-	-	1.94
Ziram	1.53	-	1.43	-	0.14	0.17	-	0.86	0.16	-	1.27

TABLE 17C. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – AVERAGE RATE OF APPLICATION (KG ACTIVE SUBSTANCE/HA)

	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Herbicides										
Diquat dibromide	-	-	-	-	-	-	-	-	-	-
Glufosinate ammonium	-	-	-	-	-	0.17	-	-	-	-
Linuron	0.52	-	0.37	-	-	-	-	-	-	2.31
M.C.P.A.	-	-	-	-	-	-	-	-	-	-
Trifluralin	0.18	0.45	-	0.18	-	-	0.25	-	-	1.30
Insecticides										
Abamectin	-	-	-	-	-	-	-	-	-	-
Acetamiprid	0.03	-	-	-	-	-	-	-	-	-
Carbaryl	0.74	1.14	-	2.96	-	0.54	-	-	0.74	1.88
Chlorpyrifos	-	0.19	-	0.32	-	0.25	-	-	-	-
Chlorpyrifos-methyl	-	-	-	0.31	-	0.33	-	-	-	-
Chlorpyrifos-methyl/cypermethrin	-	-	-	0.09	-	0.12	0.12	-	-	0.04
Cypermethrin	-	-	-	-	-	-	-	-	-	-
Deltamethrin	<-0.01	0.01	-	0.01	0.01	0.02	-	-	0.01	0.01
Dimethoate	2.12	2.25	0.17	0.30	0.15	0.12	-	0.15	0.21	-
Ethofenprox	-	-	-	-	-	-	-	-	-	-
Fenitrothion	-	-	-	0.32	-	-	-	-	-	-
Imidacloprid	-	-	-	0.04	0.07	0.01	-	-	-	-
Lufenuron	-	0.03	-	0.02	-	0.02	-	-	-	-
Malathion	1.19	0.34	-	0.82	0.57	0.62	-	0.48	1.00	0.76
Permethrin	0.06	0.06	0.18	0.10	0.09	0.12	-	-	0.18	0.07
Phenthoate	-	-	-	-	0.08	0.16	-	-	-	-
Pymetrozine	-	-	-	-	-	-	-	-	-	-
Thiacloprid	-	-	-	-	-	-	-	-	-	-

TABLE 17D. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – AVERAGE RATE OF APPLICATION (KG ACTIVE SUBSTANCE/HA)

	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes-outdoor	Tomatoes-glasshouse	Vegetable-Marrows	Water melons	Wheat	All crops
Herbicides											
Diquat dibromide	0.10	-	0.40	-	-	-	-	-	-	-	0.31
Glufosinate ammonium	-	-	0.36	-	0.03	-	-	-	0.03	-	0.18
Linuron	-	-	0.31	-	-	-	-	1.47	-	-	0.66
M.C.P.A.	-	-	-	-	-	-	-	-	-	0.99	0.99
Trifluralin	-	1.37	0.26	0.75	-	0.12	-	-	-	-	0.99
Insecticides											
Abamectin	-	-	-	<-0.01	0.01	0.01	-	0.01	<-0.01	-	< 0.01
Acetamiprid	-	-	-	-	0.56	0.06	0.04	-	0.05	-	0.12
Carbaryl	-	-	0.70	-	-	1.90	-	-	-	-	0.84
Chlorpyrifos	0.18	-	-	-	0.12	0.12	-	0.17	-	-	0.20
Chlorpyrifos-methyl	-	-	0.28	0.39	-	0.21	-	0.52	-	-	0.33
Chlorpyrifos-methyl/cypermethrin	0.10	-	-	-	0.10	0.21	-	0.12	-	-	0.15
Cypermethrin	-	-	-	-	-	0.31	-	0.05	-	-	0.06
Deltamethrin	0.02	-	<-0.01	0.05	0.01	0.01	0.01	0.01	0.02	-	0.01
Dimethoate	0.22	-	1.13	-	0.69	0.36	-	0.46	0.50	-	0.28
Ethofenprox	0.10	-	-	-	0.15	-	0.08	-	0.04	-	0.08
Fenitrothion	-	-	-	-	-	-	-	-	-	-	0.32
Imidacloprid	-	-	-	-	-	0.04	0.75	-	-	-	0.04
Lufenuron	0.02	-	0.01	-	-	0.02	0.08	-	0.01	-	0.02
Malathion	0.35	-	1.22	1.39	0.48	1.00	4.04	0.58	0.46	-	0.80
Permethrin	0.03	-	0.35	0.11	0.40	0.13	-	0.07	0.13	-	0.14
Phenthoate	0.11	-	-	-	-	-	-	-	-	-	0.13
Pymetrozine	-	-	-	-	-	0.10	0.10	0.17	-	-	0.14
Thiacloprid	-	-	-	-	0.17	0.18	-	-	0.17	-	0.18

TABLE 17E. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – AVERAGE RATE OF APPLICATION (KG ACTIVE SUBSTANCE/HA)

	Broad beans	Cabbages	Carrots	Cauliflowers	Citrus	Grapes-(quality)	Lettuce	Nectarines	Olives	Onions
Acaricides										
Acrinathrin	-	-	-	-	-	-	-	-	-	-
Dicofol	-	-	-	-	-	0.08	-	-	-	-
Propargite	-	-	-	-	-	-	-	-	-	-
Other acaricides[1]	-	-	-	-	-	-	-	-	-	-
Biological products										
Other biological products[2]	-	-	-	-	-	-	-	-	0.02-	-
Molluscicides										
Metaldehyde	-	-	-	0.13	0.05	-	0.09	-	-	-
Nematicides										
Other nematicides[3]	-	-	-	-	-	-	-	-	-	-
Repellents										
Other repellents[4]	-	-	-	-	-	0.18	-	-	-	-
Soil sterilants										
Other soil sterilants[5]	-	-	-	-	-	-	-	-	-	-

[1]Other acaricides were amitraz

[2]Other biological products were *Bacillus thuringiensis*

[3]Other nematicides were oxamyl

[4]Other repellents were anthraquinone

[5]Other soil sterilants were chlorpicrin/methyl bromide

TABLE 17F. USAGE OF PLANT PROTECTION PRODUCTS ON ALL CROPS – AVERAGE RATE OF APPLICATION (KG ACTIVE SUBSTANCE/HA)

	Peaches	Peas	Potatoes	Strawberries	Sugar melons	Tomatoes-outdoor	Tomatoes-glasshouse	Vegetable-Marrows	Water melons	Wheat	All crops
Acaricides											
Acrinathrin	0.02	-	-	0.01	0.01	-	-	-	0.01	-	0.01
Dicofol	-	-	-	-	-	-	-	-	-	-	0.08
Propargite	-	-	-	0.08	0.02	0.10	-	-	0.31	-	0.18
Other acaricides[1]	-	-	-	-	-	0.03	-	-	-	-	0.03
Biological products											
Other biological products[2]	-	-	-	-	-	-	-	-	-	-	0.02
Molluscicides											
Metaldehyde	-	-	0.09	-	-	-	-	0.11	-	0.12	0.60
Nematicides											
Other nematicides[3]	-	-	-	-	0.01	-	-	-	0.01	-	0.02
Repellents											
Other repellents[4]	-	-	-	-	-	-	-	-	-	-	0.18
Soil sterilants											
Other soil sterilants[5]	-	-	-	129.11	-	-	596.12	-	-	-	725.23

[1]Other acaricides were amitraz

[2]Other biological products were *Bacillus thuringiensis*

[3]Other nematicides were oxamyl

[4]Other repellents were anthraquinone

[5]Other soil sterilants were chlorpicrin/methyl bromide

TABLE 18. ESTIMATED USE (HA) OF THE FIFTY MOST IMPORTANT INDIVIDUAL ACTIVE SUBSTANCES (ACROSS ALL FORMULATIONS) IN DESCENDING ORDER OF IMPORTANCE BY ACTIVE SUBSTANCE AREA TREATED

Rank	Active Substance	Area treated (ha)	Chemical type	% of total active substance treated area	Cumulative percentage of area treated
1	Mancozeb	4,656.065	Fungicide	26.20	26.20
2	Metalaxyl	2,044.121	Fungicide	11.50	37.71
3	M.C.P.A.	1,659.786	Herbicide	9.34	47.05
4	Benalaxyl	1,022.894	Fungicide	5.76	52.80
5	Sulphur	952.217	Fungicide	5.36	58.16
6	Cymoxanil	681.373	Fungicide	3.83	62.00
7	Chlorothalonil	454.276	Fungicide	2.56	64.55
8	Deltamethrin	402.665	Insecticide	2.27	66.82
9	Permethrin	307.021	Insecticide	1.73	68.55
10	Propamocarb	306.829	Fungicide	1.73	70.28
11	Lufenuron	301.808	Insecticide	1.70	71.97
12	Dinocap	280.910	Fungicide	1.58	73.55
13	Dimethoate	276.867	Insecticide	1.56	75.11
14	Myclobutanil	275.002	Fungicide	1.55	76.66
15	Folpet	265.506	Fungicide	1.49	78.15
16	Fosetyl-aluminium	262.771	Fungicide	1.48	79.63
17	Chlorpyrifos-methyl	254.005	Insecticide	1.43	81.06
18	Penconazole	246.840	Fungicide	1.39	82.45
19	Malathion	236.634	Insecticide	1.33	83.78
20	Carbendazim	211.891	Fungicide	1.19	84.98
21	Cypermethrin	206.508	Insecticide	1.16	86.14
22	Copper sulphate	192.344	Fungicide	1.08	87.22
23	Carbaryl	177.488	Insecticide	1.00	88.22
24	Zineb	151.551	Fungicide	0.85	89.07
25	Oxadixyl	147.669	Fungicide	0.83	89.90
26	Thiacloprid	130.771	Insecticide	0.74	90.64
27	Copper oxychloride	114.081	Fungicide	0.64	91.28
28	Imidacloprid	109.259	Insecticide	0.61	91.90
29	Copper	108.885	Fungicide	0.61	92.51
30	Abamectin	103.458	Insecticide	0.58	93.09
31	Linuron	95.599	Herbicide	0.54	93.63
32	Procymidone	93.165	Fungicide	0.52	94.15
33	Trifluralin	92.590	Herbicide	0.52	94.68
34	Ziram	84.886	Fungicide	0.48	95.15
35	Triadimenol	71.261	Fungicide	0.40	95.55
36	Phenthoate	65.345	Insecticide	0.37	95.92
37	Chlorpyrifos	58.354	Insecticide	0.33	96.25
38	Glufosinate ammonium	58.233	Herbicide	0.33	96.58
39	Bupirimate	54.020	Fungicide	0.30	96.88
40	Bromuconazole	42.352	Fungicide	0.24	97.12
41	Metaldehyde	34.898	Molluscicide	0.20	97.32
42	Trifloxystrobin	32.422	Fungicide	0.18	97.50
43	Acetamiprid	30.642	Insecticide	0.17	97.67
44	Bordeaux mixture	30.558	Fungicide	0.17	97.84
45	Ethofenprox	30.459	Insecticide	0.17	98.02
46	Triforine	24.325	Fungicide	0.14	98.15
47	Diquat dibromide	24.126	Herbicide	0.14	98.29
48	Propargite	23.932	Acaricide	0.13	98.42
49	Acrinathrin	23.424	Acaricide	0.13	98.55
50	Fenitrothion	22.303	Insecticide	0.13	98.68

TABLE 19. ESTIMATED USE (KG) OF THE FIFTY MOST IMPORTANT INDIVIDUAL ACTIVE SUBSTANCES (ACROSS ALL FORMULATIONS) IN DESCENDING ORDER OF IMPORTANCE BY WEIGHT APPLIED

Rank	Active Substance	Weight applied (kg)	Chemical type	% of total active substance weight applied	Cumulative percentage of weight applied
1	Sulphur	54,089.9	Fungicide	26.20	84.60
2	Mancozeb	4,146.8	Fungicide	11.50	91.08
3	M.C.P.A.	1,641.0	Herbicide	9.34	93.65
4	Copper sulphate	620.5	Fungicide	5.76	94.62
5	Methyl bromide	573.3	Soil sterilant	5.36	95.52
6	Fosetyl-aluminium	382.9	Fungicide	3.83	96.11
7	Zineb	293.4	Fungicide	2.56	96.57
8	Metalaxyl	229.2	Fungicide	2.27	96.93
9	Folpet	192.4	Fungicide	1.73	97.23
10	Malathion	190.2	Insecticide	1.73	97.53
11	Carbaryl	148.6	Insecticide	1.70	97.76
12	Chlorothalonil	147.2	Fungicide	1.58	97.99
13	Ziram	107.8	Fungicide	1.56	98.16
14	Dinocap	107.1	Fungicide	1.55	98.33
15	Benalaxyl	105.5	Fungicide	1.49	98.49
16	Trifluralin	91.4	Herbicide	1.48	98.64
17	Oxadixyl	89.3	Fungicide	1.43	98.78
18	Cymoxanil	85.2	Fungicide	1.39	98.91
19	Copper oxychloride	78.8	Fungicide	1.33	99.03
20	Dimethoate	76.9	Insecticide	1.19	99.15
21	Linuron	63.4	Herbicide	1.16	99.25
22	Chlorpyrifos-methyl	49.0	Insecticide	1.08	99.33
23	Carbendazim	43.7	Fungicide	1.00	99.40
24	Permethrin	43.1	Insecticide	0.85	99.46
25	Propamocarb	40.5	Fungicide	0.83	99.53
26	Copper	36.5	Fungicide	0.74	99.58
27	Myclobutanil	24.5	Fungicide	0.64	99.62
28	Thiacloprid	23.0	Insecticide	0.61	99.66
29	Procymidone	21.1	Fungicide	0.61	99.69
30	Propachlor	17.4	Herbicide	0.58	99.72
31	Penconazole	14.1	Fungicide	0.54	99.74
32	Bupirimate	13.6	Fungicide	0.52	99.76
33	Triforine	13.1	Fungicide	0.52	99.78
34	Chlorpyrifos	11.5	Insecticide	0.48	99.80
35	Glufosinate ammonium	10.4	Herbicide	0.40	99.82
36	Copper hydroxide	10.3	Fungicide	0.37	99.83
37	Phenthoate	8.4	Insecticide	0.33	99.85
38	Diquat dibromide	7.5	Herbicide	0.33	99.86
39	Fenitrothion	7.1	Insecticide	0.30	99.87
40	Deltamethrin	6.9	Insecticide	0.24	99.88
41	Lufenuron	6.3	Insecticide	0.20	99.89
42	Pirimiphos-methyl	5.0	Insecticide	0.18	99.90
43	Iprodione	4.8	Fungicide	0.17	99.91
44	Propargite	4.3	Acaricide	0.17	99.91
45	Bordeaux mixture	4.2	Fungicide	0.17	99.92
46	Imidacloprid	4.1	Insecticide	0.14	99.93
47	Cypermethrin	3.9	Insecticide	0.14	99.93
48	Pymetrozine	3.9	Insecticide	0.13	99.94
49	Acetamiprid	3.7	Insecticide	0.13	99.94
50	Triadimenol	3.5	Fungicide	0.13	99.95

Glossary of terms as used in this report

Acaricide
: a specific type of insecticide specifically designed to control mite pests on crops

Active substance
: any substance or micro-organism, including a virus, having general or specific action against harmful organisms or on plants, parts of plants or plant products

Active substance treated area
: the area of crop treated with individual active substances within formulations (products). Thus, one hectare of crop treated with four products (consecutively or tank-mixed together), each of which comprised 2 active substances, would give 8 active substance treated hectares. (see also basic treated area and formulation treated area)

Basic treated area
: the area of crop which received plant protection product treatment, irrespective of the number of times that area might have been treated. Thus, one hectare of crop treated with four products (consecutively or tank-mixed together) would give a basic treated area of 1 hectare. (see also formulation treated area and active substance treated area)

Biological product
: a micro-organism, including parasites or diseases that are used to control pests weeds and diseases. Any micro-organism, including viruses, must be approved before it can be used as a plant protection product. Larger organisms, such as insect predators or nematodes do not have to be approved as plant protection products. However, non-native species may be subject to other legislation.

Disease
: a condition causing damage to a plant, in this report referring to that caused as a result of a fungal attack

Dry powder
: A formulation of plant protection product where the product is applied to the crop as a dust or powder

Formulation
: The combination of active substances used in a specific plant protection product product. The formulation may comprise a single active substance or be mixtures of two or more active substances

Formulation treated area
: the area of crop treated with individual formulations of plant protection products (products). Thus, one hectare of crop treated with four products (consecutively or tank-mixed together) would give 4 formulation treated hectares. (see also basic treated area and active substance treated area)

Fungicide
: a plant protection product used to control unwanted fungal diseases in plants.

Granule
: a formulation of a plant protection product where the product is applied directly to the soil (commonly) or crop (rarely) in the form of small granules either **broadcast** (over the soil or crop) or **incorporated** into the soil by mechanical means after spreading

Ground sprayer
: any tractor-mounted hydraulic spraying equipment used for applying plant protection products to crops

Herbicide
: a plant protection product used to control unwanted vegetation (weed killer) often specifically designed to selectively kill weeds in amongst crop plants, whilst leaving the crop unaffected

Insecticide
: a plant protection product used to control unwanted insects

Intensity of treatment
: an indication of the number of times a crop has been treated with plant protection products

Irrigated land (Raba' saqwi)

is land which has a continuous supply of water all the year round, whether it has a natural spring, served by second class water, or supplied by other sources

Knapsack

hydraulic plant protection product application machinery carried on the back and used to apply plant protection product sprays through a hand-held lance

Molluscicide

a plant protection product used to control unwanted slugs and snails

Nematicide

a plant protection product applied directly to the soil specifically to control plant-infecting nematodes

Pest

any organism harmful to plants or to wood or other plant products, any undesired plant and any harmful creature

Plant protection product

any substance, preparation or organism prepared or used for controlling any pest. A plant protection product consists of one or more active substances co-formulated with other materials. Formulated plant protection products exist in many forms, such as solid granules, powders or liquids

Plant protection product

an active substance or a preparation containing one or more active substances, put up in the form in which it is supplied to the user, intended to;

- protect plants or plant products against all harmful organisms or prevent the action of such organisms;
- influence the life processes of plants, other than as a nutrient (for example, as a growth regulator);
- preserve plant products, in so far as such substances or products are not subject to Community law on preservatives;
- destroy undesired plants; or
- destroy parts of plants or check or prevent the undesired growth of plants.

Product

A commercially formulated mixture containing one or more active substances, sold to be used as a plant protection product (see plant protection product above)

Repellent

a plant protection product used to protect plants by deterring pests (often birds) through its unpleasant smell or taste

Soil fumigation

A method of sterilising soil by injecting a plant protection product, usually a soil sterilant, directly into the ground

Soil sterilant

a broad-spectrum plant protection product applied directly to the soil to kill weeds and weed seeds, pests and diseases in the soil prior to planting, usually, high value crops such as strawberries

Utilised agricultural area (UAA)

The Agricultural land in Malta, or the total land declared by farmers, is classified into three categories as follows:

- Dry-farmed land (Raba' baghli) that is land that depends exclusively on rainwater for irrigation of crops, but may be watered on a few occasions.
- Irrigated land (Raba' saqwi) that is land that has a continuous supply of water all year round and is irrigated by water from sources other than rainwater.
- Unutilised/garigue land (Raba' Moxa), which is a term, used to describe all non-productive registered agricultural land.

The sum of the first two categories represents the total agricultural land area that is further subdivided into uncultivated land and utilised agricultural area (UAA) that includes arable land, land used for production of horticultural crops, vineyards and orchards.

In 2001, the total agricultural land area declared by farmers in the Maltese islands was established at 11,619.9 ha of which 1,471 ha or 12.7% were classified as garigue and the remaining 87.3% or 10,148 ha as agricultural land. An average of 4.8% of the agricultural area is unutilised or abandoned. While the island of Malta has 255.8 ha, Gozo has 236.3 ha of unutilised land area, representing 3.1% and 12.1% of the total agricultural land area, respectively.

Weed

any plant growing in a location where it is not wanted.

ANNEXE

NSO Reference	
Mr/Mrs/Ms/Messrs	
Dar Nru / Isem ***House No / Name***	
Triq ***Street***	
Lokalita' ***Locality***	
Nru. Tat-Telefon ***Telephone Number***	
Nru. Tal-Mobile ***Mobile Number***	
Karta ta' l-Identita' *Identity Card*	

Plant Protection Products
September 2004 – August 2005

NATIONAL STATISTICS OFFICE • MALTA

Interviewer _____

Farmer _____

Parcel No	Crop						

NSO Reference	Field Number	Crop Order

Crop	Irrigated (*tick where applicable*)				Area Under Crop Ha	Sowing Date (period/month)	Harvest Date (period/month)	Age of Crop (Permanent only)
	Yes		No					

Treatment Round	Date of Treatment (period/month)	Area Treated Ha	Product Name	Total Amount Applied Kgs/Lts	Method of Application	Volume of Water Used with PPPs Lts
0*						

* *0 refers to any pre-planting treatment which includes soil sterilisation, herbicides, and fumigation. Mark N/A if pre-planting treatment was not used.*