# CORESTA GUIDE N° 1

## THE CONCEPT AND IMPLEMENTATION OF AGROCHEMICAL GUIDANCE RESIDUE LEVELS

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# THE CONCEPT AND IMPLEMENTATION OF AGROCHEMICAL GUIDANCE RESIDUE LEVELS


## Abstract

Guidance Residue Levels have been developed by the CORESTA Agro-Chemical Advisory Committee, to provide guidance to tobacco growers and those in the tobacco industry interested in agrochemical application and the implementation of Good Agricultural Practice in tobacco production.

GRLs are intended to assist with the interpretation and evaluation of agrochemical residue testing results and serve as an indicator that GAP is being implemented. In 2003 GRLs were developed for 99 agrochemicals, which may be included in the range of agrochemical residue analysis routinely offered by the major testing laboratories. This first list has now been revised to include 118 agrochemicals. Additionally, levels for some of the compounds in the original list have been changed following a full review of all compounds in the light of continuing changes in agrochemical registrations, labels, regulations and agricultural practices, and based on improvements in analytical methods, knowledge of degradation patterns and information about residues.

GRLs do not replace requirements to comply with regulations, neither on the use of agrochemicals, nor with regard to residue levels that may be detected. GRLs are designed to emphasise the importance of GAP for growing quality tobacco.


## Introduction

Tobacco cultivation, like the production of nearly all other crops, requires appropriate measures to protect the growing plant in order to secure desired quality and acceptable yield, as well as to preserve the crop after harvesting. Responsible and considerate use of agrochemicals may, in some cases, lead to unavoidable residues remaining on the crop. Consequently, just as is the case with other crops, agrochemical residues may be detectable on commercial tobacco and in finished tobacco products.

International and national authorities regulate the residues of agrochemicals in food and feed crops, but there is no universal consensus with regards to tobacco. CORESTA members have identified the need to provide information to the tobacco growers and tobacco industry based on the best available technical and scientific knowledge and historical residue data on tobacco. This guidance should be based on the levels of residues that may be present after applications of agrochemicals using Good Agricultural Practice (GAP).

In some countries both growers and companies have legal obligations to address the use of agrochemicals in tobacco cultivation and the presence of residues on tobacco. They should also act in a socially responsible manner ensuring that agrochemicals are used responsibly in accordance with Good Agricultural Practice. Legal obligations can include compliance with all applicable statutory Maximum Residue Levels (MRLs).

Good Agricultural Practice in the Use of Pesticides, as defined by Codex Alimentarius[1], *includes the nationally authorised safe uses of pesticides under actual conditions necessary for effective and reliable pest control. It encompasses a range of levels of pesticide applications up to the highest authorised use, applied in a manner which leaves a residue which is the smallest amount practicable.*

*Authorised safe uses are determined at the national level and include nationally registered or recommended uses, which take into account public and occupational health and environmental safety considerations. Actual conditions include any stage in the production, storage, transport, distribution and processing of food commodities and animal feed.*

The authorised safe use forms a section of the "Product Label" and in many countries handlers and users who do not comply in detail with these instructions may be prosecuted. The usual information on the Label includes the crops that the product can be applied to, the timings and maximum number of applications per season, the application rate, the interval between the last application and harvest and considerable information on safety aspects. Compliance with the Product Label is, therefore, the key element of Good Agricultural Practice in the Use of Pesticides. CORESTA and its Agro-Chemical Advisory Committee (ACAC) strongly support the use of Good Agricultural Practice in tobacco production and have used this as the main

principle for this proposal on guidance residue levels.

The international oversight guidance for agrochemicals residues in food is through Codex Alimentarius. Codex MRLs, which are primarily intended to apply in international trade, are used to assist national governments in setting their maximum residue levels and are based on GAP.

## Development of Guidance Residue Levels

In order to provide guidance to tobacco growers and the tobacco industry with regard to agrochemical residues on cured tobacco leaf, ACAC has developed over the past years the concept of Guidance Residue Levels (GRLs). GRLs embrace the same concepts used by Codex, but to avoid any confusion over terminology the term Guidance Residue Levels is proposed thereby distinguishing these levels from regulatory MRLs. The purpose of GRLs is to provide a benchmark for comparing results obtained from agrochemical residue testing of leaf samples. They attempt to answer the questions:

- what residue should one expect when the label recommendations and consequently GAP are being complied with?
- how can one distinguish between residues that result from authorised use, unauthorised use or another environmental source of an agrochemical?

Agrochemicals were categorised into four groups:

1. agrochemicals that are authorised for use on tobacco;
2. obsolete or unauthorised agrochemicals that may still be available to farmers in some countries;
3. obsolete agrochemicals that may persist in the growing environment;
4. certain agrochemicals with well established statutory Maximum Residue Levels.

| ***Category of Agrochemical*** | ***Basis for Guidance Residue Level*** |
|---|---|
| Important agrochemicals authorised for use on tobacco. In most instances, this had to be based on historical residue information rather than supervised trials | Applicable legislated levels, or the highest acceptable residue that might be expected from GAP |
| Agrochemicals that should not be used on tobacco or are not known to be authorised for use on tobacco | The Limits of Quantitation with the current analytical methods |
| Agrochemicals that are no longer used but remain in the environment | Internationally accepted residue levels or legal / regulatory MRLs |
| Agrochemicals that are covered by specific tobacco laws and regulations but not covered in any of the above categories | The legal / regulatory MRLs |

As is the case with setting MRLs, which are set "by an experienced expert after he has consulted all the available documentation and information on the residue situation of the envisaged application of the product"[2], the GRLs were developed from many different sources of information. A commercial database[3] and information about registration in several countries were used for determining the most important agrochemicals that are being sold for use on tobacco. Cognizance was made of those pesticides that are being severely restricted through the different international conventions[4,5] and the agrochemical residues commonly tested for in national residue monitoring programmes[6,7]. Those agrochemical residues that arise as contaminants from environmental sources (including former agricultural uses) and are given in Codex as Extraneous Maximum Residue Limit[8] (EMRL) were also used as an information source.

**The current list does not necessarily include every agrochemical authorised for use on tobacco some place in the world. Exclusion of particular agrochemicals from the list of GRLs would *not* mean that their use was unacceptable, so long as use complied with all relevant laws and regulations. At the same time, inclusion of particular agrochemicals in the list of GRLs does not mean that their use is specifically endorsed**.

The GRLs have also been broadly compared with acceptable intake levels established for food evaluation by the U.S. EPA[9] and JMPR[10] where they were available.

Limited residue data are available from specific GAP field experiments conducted by manufacturers and research institutes. In addition, for a number of years agrochemical residues have been examined on tobacco leaf to confirm compliance with the relevant standards. Over time, these measurements have given a good indication of agrochemical residue levels that can be expected even when GAP is followed. ACAC has reviewed these data and examined relevant laws and regulations to develop a list of Guidance Residue Levels (GRLs) for a number of commonly tested agrochemicals.

In determining the GRLs for individual residues, account was also taken of the chemical and physical properties of the compound and the precision at which the residue can be measured.

Some agrochemicals that are known to be widely authorised for use on tobacco tend to have higher GRLs but for some non-persistent, or non-systemic soil applied active ingredients, such as some of the organophosphates, the GRLs are lower. Some of the differences between the GRLs for the unauthorised active ingredients are the capability of the major tobacco residue testing laboratories to detect the residue. In order to ensure that the GRLs can be reliably detected by most laboratories the Limits of Detection (LOD) and Limits of Quantitation (LOQ) of several laboratories were examined and a consensus value arrived at for these residues.

Guidance Residue Levels are now defined, using the information detailed above, for 118 individual, or groups of, agrochemical active ingredients (Table 1). In two exceptional cases, dithiocarbamates (EBDCs) and maleic hydrazide (MH), it was recognised that the proper use of the agrochemical is determined by a number of complex factors that may be quite variable from area to area. Rather than suggesting multiple GRLs for different situations, ACAC decided to specify only one GRL for each agrochemical and amend it by clearly worded admonitory commentaries offering advice and warning.

## Use of Guidance Residue Levels

The main purpose of providing this guidance is to assist the sectors of the tobacco industry, most closely associated with tobacco leaf producers, in the evaluation of results from agrochemical residue testing. Companies determine for themselves the analysis to be conducted in order to identify specific agrochemical residues. This may depend on where tobaccos are grown or purchased, the necessity to comply with statutory MRLs, or their own product (leaf or finished product) stewardship programmes. The introduction of the GRL concept should allow the same information to also be used for monitoring compliance to GAP.

The list of GRL values is neither a regulatory requirement nor mandatory - but is designed to emphasize the importance of GAP for growing good quality tobacco. In some cases, results for individual agrochemicals will be obtained that exceed the GRL. This, along with other evidence, could be taken as a preliminary indication that Good Agricultural Practice might not have been observed and that remedial action may be required to ensure that, in the future, farmers have followed proper procedures. In a small number of exceptional cases, perhaps arising from local environmental and practical considerations, there may be valid reasons, even under strict compliance with Good Agricultural Practice, why residues of a few active ingredients exceed a specified GRL. An illustration of this is the residues of the two agrochemicals mentioned above – the dithiocarbamates and maleic hydrazide (MH).

In countries with severe blue mould epidemics and where only dithiocarbamate fungicides are available for combating this disease, residues above the stated 5 ppm might arise. Where effective systemic fungicides, such as metalaxyl and dimethomorph, are authorised and insensitive strains do not occur, the problem is much less and the specified level more easily achievable. In countries where blue mould does not occur regularly in the field it should not be necessary to apply these fungicides. For late season leaf diseases alternative fungicides should, if possible, be found or the dithiocarbamates used with care with strict adherence to the label on the harvest interval.

With maleic hydrazide, the residues are very dependent on the amount of rainfall following application. Small amounts of rain can substantially reduce the level of residues but in dry years even when it has been applied according to the current label conditions there could be difficulties achieving the 80 ppm. There is considerable research into finding agronomic practices to reduce residue levels. For example, examining different rates of application in conjunction with fatty alcohols, sprayer and spray nozzle designs, changes to fertilizer applications and new sucker control chemicals.

Following this approach, potential elevated residues can be addressed. The GRL concept

should be viewed as a way of establishing targets for improvement aimed at a further reduction of agrochemical residue levels and as roadmaps to improve agricultural practices and compliance with GAP. It is intended that GRLs should become an integral part in the pragmatic management of agrochemical residues on tobacco along with appropriate approaches for sampling, residue testing, the assessment of analytical results and an action plan from the results.

If the information from the residue analysis can be fed back to the extension services and farmers in the areas where issues have been highlighted, real progress can be made to address any problems.

Based on past history, the main reasons for a residue exceeding a GRL of an agrochemical authorised for use are often: applications of an agrochemical too close to harvesting; too many applications in any one crop year and exceeding the recommended application rate. Information pertaining to application rate, timing and harvest interval should be on the Product Label, and if the agrochemical has been appropriately scrutinised during the authorisation procedures, few issues with residues exceeding the GRLs should arise.

## Future Developments

The GRL concept continues to be a major part of ACAC's work in the future. The list of GRLs will be periodically reviewed to reflect changes in agrochemical registrations and labels, laws and regulations, agricultural practices, information and data from residue trials and or other scientific knowledge. There are also discussions on how this objective assessment of residue information can facilitate sharing of information so that areas of general concern can be more openly identified. Once the issues have been identified, CORESTA and ACAC may be able to give appropriate guidance and assistance to the leaf production sector on residue issues. In connection with this proposal on GRLs, ACAC is working with the CORESTA Agrochemical Analysis Sub-Group on a proficiency testing programme, whereby individual laboratories involved in tobacco residue testing can benchmark their methods with other companies undertaking the same test. This is facilitating harmonisation on limits of quantitation and gives CORESTA members increased confidence that their samples are being tested with appropriate methods.

The development of the concept and details of GRLs is a joint activity of all ACAC members, comprised of representatives of the leaf growing, processing and manufacturing sectors of the Tobacco Industry. Although implementation is an individual matter for companies, the members of ACAC envisage industry-wide acceptance of GRLs as a useful measure for ensuring adherence to GAP.

## References


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4. Rotterdam Convention on the Prior Informed Consent procedure for certain hazardous chemicals and pesticides in international trade. Rotterdam, Netherlands 10th September 1998 http://treaties.un.org/doc/publication/mtdsg/volume%20ii/chapter%20xxvii/xxvii-14.en.pdf
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6. European Commission (2003). Monitoring of Pesticide Residues in products of plant origin in the European Union, Norway, Iceland and Liechtenstein 2001 Report. Sanco/20/03 Final. http://ec.europa.eu/food/fvo/specialreports/pesticide_residues/report_2001_en.pdf
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8. Codex maximum residue limits for pesticides http://www.codexalimentarius.net/pestres/data/index.html
9. US Environmental Protection Agency, Pesticide Reregistration Status. http://www.epa.gov/oppsrrd1/reregistration/status.htm
10. Inventory of IPCS and other WHO pesticide evaluations and summary of toxicological evaluations performed by the Joint Meeting on Pesticide Residues (JMPR). Evaluations through 2002. WHO/PCS/02.3 http://www.who.int/pcs/jmpr/inventory.htm

## Table 1. **Agrochemical Guidance Residue Levels**

| No. | Agrochemical | GRL (ppm) | Residue definition | Notes |
|---|---|---|---|---|
| 1 | 2,4,5-T | 0.05 | 2,4,5-T | |
| 2 | 2,4-D | 0.20 | 2,4-D | |
| 3 | Acephate | 0.20 | Acephate | |
| 4 | Acetamiprid | 2.50 | Acetamiprid | |
| 5 | Acibenzolar-S-methyl | 5.00 | Acibenzolar-S-methyl | |
| 6 | Alachlor | 0.10 | Alachlor | |
| 7 | Aldicarb (Σ) | 0.50 | sum of Aldicarb, Aldicarb sulfoxide and Aldicarb sulfone, expressed as Aldicarb | |
| 8 | Aldrin + Dieldrin | 0.05 | Aldrin + Dieldrin | |
| 9 | Azinphos-ethyl | 0.30 | Azinphos-ethyl | |
| 10 | Azinphos-methyl | 0.30 | Azinphos-methyl | |
| 11 | Benalaxyl | 2.00 | Benalaxyl | |
| 12 | Benfluralin | 0.06 | Benfluralin | |
| 13 | Benomyl [(a)] | | sum of Benomyl, Carbendazim, and Thiophanate-methyl expressed as Carbendazim | see Carbendazim |
| 14 | Bifenthrin | 2.50 | Bifenthrin | |
| 15 | Bromophos | 0.20 | Bromophos | |
| 16 | Butralin | 5.00 | Butralin | |
| 17 | Camphechlor (Σ) (Toxaphene) | 0.10 | Camphechlor (mixture of chlorinated camphenes) | |
| 18 | Captan | 0.70 | Captan | |
| 19 | Carbaryl | 0.50 | Carbaryl | |
| 20 | Carbendazim [(a)] | 2.00 | sum of Benomyl, Carbendazim, and Thiophanate-methyl expressed as Carbendazim | |
| 21 | Carbofuran (Σ) | 0.50 | sum of Carbofuran and 3-Hydroxycarbofuran expressed as Carbofuran | |
| 22 | Chinomethionate | 0.20 | Chinomethionate | |
| 23 | Chlordane (Σ) | 0.10 | sum of cis-Chlordane and trans-Chlordane | |
| 24 | Chlorfenvinphos (Σ) | 0.05 | sum of (E)-Chlorfenvinphos and (Z)-Chlorfenvinphos | |
| 25 | Chlorothalonil | 2.00 | Chlorothalonil | |
| 26 | Chlorpyrifos | 0.50 | Chlorpyrifos | |
| 27 | Chlorpyrifos-methyl | 0.20 | Chlorpyrifos-methyl | |
| 28 | Chlorthal-dimethyl | 0.50 | Chlorthal-dimethyl | |
| 29 | Clomazone | 0.20 | Clomazone | |
| 30 | Cyfluthrin (Σ) | 2.00 [(g)] | Cyfluthrin (sum of all isomers) | In line with the policy of periodic reviews of GRLs by the Agrochemical Advisory Committee of CORESTA, a provisional Guidance Residue Level (GRL) for Cyfluthrin has been set at 2.00 ppm. This is the result of new, scientifically based information and the consequent setting of an MRL, also of 2.00 ppm, by a national authority. This provisional GRL will be reviewed again in the future based on the outcome of further residue trials and analytical results from forthcoming tobacco crops. *(June 2010)* |
| 31 | Cyhalothrin (Σ) | 0.40 | Cyhalothrin (sum of all isomers) | |
| 32 | Cymoxanil | 0.10 | Cymoxanil | |

| No. | Agrochemical | GRL (ppm) | Residue definition | Notes |
|---|---|---|---|---|
| 33 | Cypermethrin (Σ) | 1.00 | Cypermethrin (sum of all isomers) | |
| 34 | DBCP | 0.05 | DBCP (1,2-dibromo-3-chloropropane) | |
| 35 | DDT (Σ) | 0.20 | sum of o,p'- and p,p'-DDT, o,p'- and p,p'-DDD (TDE), o,p'- and p,p'-DDE expressed as DDT | |
| 36 | Deltamethrin [(b)] | 1.00 | sum of Deltamethrin and Tralomethrin expressed as Deltamethrin | |
| 37 | Demeton-S-methyl (Σ) | 0.10 | sum of Demeton-S-methyl, Oxydemeton-methyl (Demeton-S-methyl sulfoxide) and Demeton-S-methyl sulfone expressed as Demeton-S-methyl | |
| 38 | Diazinon | 0.10 | Diazinon | |
| 39 | Dicamba | 0.20 | Dicamba | |
| 40 | Dichlorvos [(c)] | 0.10 | sum of Dichlorvos, Naled and Trichlorfon expressed as Dichlorvos | |
| 41 | Dicloran | 1.00 | Dicloran | |
| 42 | Diflubenzuron | 0.10 | Diflubenzuron | |
| 43 | Dimefox | 0.01 | Dimefox | |
| 44 | Dimethoate [(d)] | 0.50 | sum of Dimethoate and Omethoate expressed as Dimethoate | |
| 45 | Dimethomorph (Σ) | 2.00 | sum of (E)-Dimethomorph and (Z)-Dimethomorph | |
| 46 | Dinocap (Σ) | 0.10 | sum of Dinocap isomers and Dinocap phenols expressed as Dinocap | Currently, Dinocap isomers expressed as Dinocap (Σ) because Dinocap phenols standard is not available. Dinocap phenols should be also expressed as Dinocap (Σ) when standard will be available. |
| 47 | Diphenamid | 0.25 | Diphenamid | |
| 48 | Disulfoton (Σ) | 0.10 | sum of Disulfoton, Disulfoton sulfoxide, and Disulfoton sulfone expressed as Disulfoton | |
| 49 | Dithiocarbamates (as $CS_2$) [(e)] | 5.00 | Dithiocarbamates expressed as $CS_2$ | In countries where fungal diseases such as blue mould are a persistent problem in the field throughout the growing season, the use of dithiocarbamates (DTC) fungicides may be an essential part of the season-long disease management strategy and in keeping with GAP as a means of ensuring crop quality and economic viability for the producer. Under high disease pressure residues of dithiocarbamates (DTC) fungicides slightly in excess of the specified GRL may be observed. In countries where there is not a field fungal disease problem the use of fungicides is not necessary, and there should be no residues detected. Consistent with GAP, dithiocarbamates (DTC) fungicides must be used only according to label instructions to combat fungal diseases in the seedbed and in the field. |
| 50 | Endosulfans (Σ) | 1.00 | sum of alpha- and beta-isomers and Endosulfan-sulphate expressed as Endosulfan | |

| No. | Agrochemical | GRL (ppm) | Residue definition | Notes |
|---|---|---|---|---|
| 51 | Endrin | 0.05 | Endrin | |
| 52 | Ethoprophos | 0.10 | Ethoprophos | |
| 53 | Ethylene dibromide | 0.05 | Ethylene dibromide | |
| 54 | Famoxadone | 5.00 | Famoxadone | |
| 55 | Fenamiphos (Σ) | 0.50 | sum of Fenamiphos, Fenamiphos sulfoxide and Fenamiphos sulfone expressed as Fenamiphos | |
| 56 | Fenchlorphos | 0.10 | Fenchlorphos | |
| 57 | Fenitrothion | 0.10 | Fenitrothion | |
| 58 | Fensulfothion | 0.05 | Fensulfothion | |
| 59 | Fenthion (Σ) | 0.10 | sum of Fenthion, Fenthion sulfoxide and Fenthion sulfone expressed as Fenthion | |
| 60 | Fenvalerate (Σ) | 1.00 | Fenvalerate (sum of all isomers including Esfenvalerate) | |
| 61 | Fluazifop-butyl (Σ) | 1.00 | Fluazifop-butyl (sum of all isomers) | |
| 62 | Flucythrinate (Σ) | 0.50 | Flucythrinate (sum of all isomers) | |
| 63 | Flumetralin | 5.00 | Flumetralin | |
| 64 | Folpet | 0.20 | Folpet | |
| 65 | Fonofos (Σ) | 0.10 | Fonofos (sum of all isomers) | |
| 66 | Formothion | 0.10 | Formothion | |
| 67 | HCH (α-, β-, δ-) | 0.07 | HCH (α-, β-, δ-) | |
| 68 | HCH (γ-) (Lindane) | 0.05 | HCH (γ-) (Lindane) | |
| 69 | Heptachlor (Σ) | 0.05 | sum of Heptachlor and two Heptachlor epoxides (cis- and trans-) expressed as Heptachlor | |
| 70 | Hexachlorobenzene | 0.03 | Hexachlorobenzene | |
| 71 | Imidacloprid | 5.00 | Imidacloprid | |
| 72 | Iprodione (Σ) | 0.25 | sum of Iprodione and N-3,5-dichlorophenyl-3-isopropyl-2,4-dioxoimidazolyzin-1-carboxamide expressed as Iprodione | |
| 73 | Isopropalin | 0.10 | Isopropalin | |
| 74 | Malathion | 0.50 | Malathion | |
| 75 | Maleic hydrazide | 80.00 | Maleic hydrazide (free and bounded form) | In some instances, where GAP is implemented and label recommendations with regard to application rates and timing are strictly adhered to, residue levels may exceed the current GRL of 80 ppm as a result of limited rainfall and the current technology available for application. However, as with all agrochemicals, all efforts should be made to strictly follow label application rates, and use should be no more than necessary to achieve the desired effect. |
| 76 | Metalaxyl (Σ) | 2.00 | sum of all isomers including Metalaxyl-M / Mefenoxam | |
| 77 | Methamidophos | 1.00 | Methamidophos | |
| 78 | Methidathion | 0.10 | Methidathion | |
| 79 | Methiocarb (Σ) | 0.20 | sum of Methiocarb, Methiocarb sulfoxide, and Methiocarb sulfone expressed as Methiocarb | |
| 80 | Methomyl [(f)] | 1.00 | sum of Methomyl, Methomyl-oxim, and Thiodicarb expressed as Methomyl | |

| No. | Agrochemical | GRL (ppm) | Residue definition | Notes |
|---|---|---|---|---|
| 81 | Methoprene | 1.00 | Methoprene | |
| 82 | Methoxychlor | 0.05 | Methoxychlor | |
| 83 | Mevinphos (Σ) | 0.10 | Mevinphos (sum E and Z isomers) | |
| 84 | Mirex | 0.10 | Mirex | |
| 85 | Monocrotophos | 0.30 | Monocrotophos | |
| 86 | Naled [(c)] | | sum of Dichlorvos, Naled, and Trichlorfon expressed as Dichlorvos | see Dichlorvos |
| 87 | Nitrofen | 0.02 | Nitrofen | |
| 88 | Omethoate [(d)] | | sum of Dimethoate and Omethoate expressed as Dimethoate | see Dimethoate |
| 89 | Oxadixyl | 0.10 | Oxadixyl | |
| 90 | Oxamyl | 0.50 | Oxamyl | |
| 91 | Parathion (-ethyl) | 0.10 | Parathion | |
| 92 | Parathion-methyl | 0.10 | Parathion-methyl | |
| 93 | Pebulate | 0.50 | Pebulate | |
| 94 | Penconazole | 2.00 | Penconazole | |
| 95 | Pendimethalin | 5.00 | Pendimethalin | |
| 96 | Permethrin (Σ) | 0.50 | Permethrin (sum of all isomers) | |
| 97 | Phorate | 0.10 | Phorate | |
| 98 | Phosalone | 0.10 | Phosalone | |
| 99 | Phosphamidon (Σ) | 0.10 | Phosphamidon (sum of E and Z isomers) | |
| 100 | Phoxim | 0.50 | Phoxim | |
| 101 | Piperonyl butoxide | 3.00 | Piperonyl butoxide | |
| 102 | Pirimicarb | 0.50 | Pirimicarb | |
| 103 | Pirimiphos-methyl | 0.10 | Pirimiphos-methyl | |
| 104 | Profenofos | 0.10 | Profenofos | |
| 105 | Propoxur | 0.20 | Propoxur | |
| 106 | Pymetrozine | 1.00 | Pymetrozine | |
| 107 | Pyrethrins (Σ) | 0.50 | sum of Pyrethrins 1, Pyrethrins 2, Cinerins 1, Cinerins 2, Jasmolins 1 and Jasmolins 2 | |
| 108 | Tefluthrin | 0.10 | Tefluthrin | |
| 109 | Terbufos (Σ) | 0.05 | sum of Terbufos, Terbufos sulfoxide and Terbufos sulfone expressed as Terbufos | |
| 110 | Tetrachlorvinphos | 0.10 | Tetrachlorvinphos | |
| 111 | Thiamethoxam | 5.00 | Thiamethoxam | |
| 112 | Thiodicarb [(f)] | | sum of Methomyl, Methomyl-oxim, and Thiodicarb expressed as Methomyl | see Methomyl |
| 113 | Thionazin | 0.05 | Thionazin | |
| 114 | Thiophanate-methyl | | sum of Benomyl, Carbendazim, and Thiophanate-methyl expressed as Carbendazim | see Carbendazim |
| 115 | Tralomethrin | | sum of Deltamethrin and Tralomethrin expressed as Deltamethrin | see Deltamethrin |
| 116 | Trichlorfon [(c)] | | sum of Dichlorvos, Naled, and Trichlorfon expressed as Dichlorvos | see Dichlorvos |
| 117 | Trifluralin | 0.10 | Trifluralin | |
| 118 | Vamidothion (Σ) | 0.10 | sum of Vamidothion, Vamidothion sulfoxide and Vamidothion sulfone expressed as Vamidothion | |

(a) Carbendazim is the degradation product of Benomyl and Thiophanate-methyl. In the case the same sample contains residues of both Carbendazim and/or Benomyl/Thiophanate-methyl, the sum of the residues should not exceed 2.00 ppm.

(b) Deltamethrin is the degradation product of Tralomethrin. In the case the same sample contains residues of both Deltamethrin and Tralomethrin, the sum of the two residues should not exceed 1.00 ppm.

(c) Dichlorvos is the degradation product of Naled and Trichlorfon. In the case the same sample contains residues of both Dichlorvos and/or Naled/Trichlorfon, the sum of the residues should not exceed 0.10 ppm.

(d) Omethoate is the degradation product of Dimethoate. In the case the same sample contains residues of both Dimethoate and Omethoate, the sum of the two residues should not exceed 0.50 ppm.

(e) The Dithiocarbamates Group includes the EBDCs: Mancozeb, Maneb, Metiram, Nabam and Zineb – as well as Amobam, Ferbam, Policarbamate, Propineb, Thiram and Ziram.

(f) Methomyl is the degradation product of Thiodicarb. In the case the same sample contains residues of both Methomyl and Thiodicarb, the sum of the two residues should not exceed 1.00 ppm.

(g) The 2.00 ppm figure for Cyfluthrin is a provisional GRL. It replaces the previous GRL of 0.50 ppm. *(June 2010)*