



# CORESTA GUIDE N° 1

THE CONCEPT AND IMPLEMENTATION OF  
CPA GUIDANCE RESIDUE LEVELS

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This new version cancels and replaces the version dated June 2008 (with June 2010 addendum)

# THE CONCEPT AND IMPLEMENTATION OF CPA GUIDANCE RESIDUE LEVELS

## Executive Summary

- Guidance Residue Levels (GRLs) are in the remit of the Agro-Chemical Advisory Committee (ACAC) of CORESTA. Their development is a joint activity of all ACAC members, who represent the leaf production, processing and manufacturing sectors of the Tobacco Industry. The concept of GRLs and their implementation are described in this guide.
- GRLs provide guidance to tobacco growers and assist with interpretation and evaluation of results from analyses of residues of crop protection agents (CPAs\*). They therefore serve as an indicator that Good Agricultural Practice with respect to crop protection agents (GAP-CPAs) is being implemented. The principles of GAP-CPAs for tobacco are given in “Section V. Agrochemical Management” of CORESTA Guide No. 3 – “Good Agricultural Practices (GAP) Guidelines” [[www.coresta.org/Guides/Guide-No03-GAP\\_Feb05.pdf](http://www.coresta.org/Guides/Guide-No03-GAP_Feb05.pdf)].
- Compliance with the statutory conditions of use of each CPA as shown in its product “label” is central to using GRLs as a means for monitoring GAP-CPAs. The relevant information in this context is:
  - Trade and common names of the product;
  - Active ingredient(s);
  - Type of CPA (herbicide, insecticide, suckercide, etc.);
  - Local registration for use on tobacco;
  - Target pests;
  - Timing of application (growth stage) and maximum number of applications;
  - Rate(s) of application;
  - Pre-harvest interval;
  - Mixing and method(s) of application.
- The GRL list is comprised of compounds banned for use in agriculture by International Conventions, those not registered for tobacco but that may occasionally contaminate the crop and those registered for tobacco and in common use. It is important to note that:
  - **It is not a list of recommended CPAs for tobacco. That is a matter for official and/or industry bodies in each country;**
  - **GRLs have not yet been set for all CPAs registered for tobacco. Setting GRLs is an ongoing process based on a list of priorities decided by frequency of use and importance to leaf production;**
  - **The presence of a compound does not imply endorsement by CORESTA;**
  - **The entries in the list do not replace MRLs (maximum residue levels) set by the authorities. Compliance with MRLs is a legal requirement for countries that have set them for tobacco.**
- The list is reviewed periodically in the light of new information on regulations, analytical capabilities and registration status.
- The following sources of information are referred to when setting GRLs:
  - Results from supervised field trials, where available;
  - Legislation on MRLs for tobacco and other crops;
  - ACAC CPA residue database (CARD);
  - ACAC GAP-CPAs database;
  - Limits of Quantification (provided by CORESTA Agrochemical Analysis Sub-Group); and
  - Information provided by CPA manufacturers and tobacco agronomists.
- Reference material and criteria adopted for the setting of each GRL are documented and stored by CORESTA.

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\* CPAs are agrochemicals used to protect crops from pests and diseases, control unwanted plants (weeds) and regulate growth.

## 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 CPA application and the implementation of Good Agricultural Practice (GAP) in tobacco production.

GRLs are intended to assist with the interpretation and evaluation of CPA residue testing results and serve as an indicator that GAP is being implemented. In 2003 GRLs were developed for 99 CPAs, which may be included in the range of CPA residue analysis routinely offered by the major testing laboratories. This first list has now been revised to include 120 CPAs. 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 CPA 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 CPAs, 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 CPAs may, in some cases, lead to unavoidable residues remaining on the crop. Consequently, just as is the case with other crops, CPA residues may be detectable on commercial tobacco and in finished tobacco products.

International and national authorities regulate the residues of CPAs 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 CPAs using Good Agricultural Practice (GAP).

In some countries both growers and companies have legal obligations to address the use of CPAs in tobacco cultivation and the presence of residues on tobacco. They should also act in a socially responsible manner ensuring that CPAs 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 (GAP-CPAs), as defined by Codex Alimentarius<sup>[1]</sup>, 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, one of the key elements of Good Agricultural Practice. 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 CPAs 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-CPAs.

## Development of Guidance Residue Levels

In order to provide guidance to tobacco growers and the tobacco industry with regard to CPA 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 CPA residue testing of leaf samples. They attempt to answer the questions:

- What residue should one expect when the label recommendations are being followed and GAP is being implemented?

- How can one distinguish between residues that result from authorised use, unauthorised use or another environmental source of a CPA?

CPAs were categorised into four groups:

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

<i>Category of CPA</i>	<i>Basis for Guidance Residue Level</i>
Important CPAs authorised for use on tobacco	Applicable legislated levels, or the highest acceptable residue that might be expected from GAP
CPAs that should not be used on tobacco or are not known to be authorised for use on tobacco	The Limits of Quantification with the current analytical methods
CPAs that are no longer used but remain in the environment	Internationally accepted residue levels or legal / regulatory MRLs
CPAs 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”<sup>[2]</sup>, the GRLs were developed from many different sources of information. A commercial database<sup>[3]</sup> and information about registration in several countries were used for determining the most important CPAs that are being sold for use on tobacco. Cognisance was made of those CPAs that are being severely restricted through the different international conventions<sup>[4,5]</sup> and the CPA residues commonly tested for in national residue monitoring programmes<sup>[6,7]</sup>. Those CPA residues that arise as contaminants from environmental sources (including former agricultural uses) and are given in Codex as Extraneous Maximum Residue Limit<sup>[8]</sup> (EMRL) were also used as an information source.

**The current list does not necessarily include every CPA authorised for use on tobacco some place in the world. Exclusion of particular CPAs 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 CPAs 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<sup>[9]</sup> and JMPR<sup>[10]</sup> where they were available.

Limited residue data are available from specific GAP-CPAs field experiments conducted by manufacturers and research institutes. In addition, for a number of years CPA residues have been examined on tobacco leaf to confirm compliance with the relevant standards. Over time, these measurements have given a good indication of CPA 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 CPAs.

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 CPAs 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 Quantification (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 120 individual, or groups of, CPA active ingredients (Table 1). In two exceptional cases, dithiocarbamates (EBDCs) and maleic hydrazide (MH), it was recognised that the proper use of the CPA 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 CPA and amend it by clearly worded advisory 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 CPA residue testing. Companies determine for themselves the analysis to be conducted in order to identify specific CPA 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 emphasise the importance of GAP for growing good quality tobacco. In some cases, results for individual CPAs 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 CPAs 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 fertiliser 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 CPA residue levels and as roadmaps to improve Good Agricultural Practice and including GAP-CPAs. It is intended that GRLs should become an integral part in the pragmatic management of CPA 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 a CPA authorised for use are often: applications of a CPA 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 CPA 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 CPA 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 quantification 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

1. Codex Alimentarius General Requirements Volume 1A (1995). Food and Agriculture Organization Rome
2. Commission of the European Communities (1995). Calculation of maximum residue levels and safety intervals. 7039/VI/95 En 22/7/1997 Appendix 1
3. Sigma Database Agrochemical Use on Tobacco (1999). Produce Studies Research, Newbury Berks. UK
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>
5. Stockholm Convention on Persistent Organic Pollutants. Stockholm, Sweden 22nd May 2001  
<http://www.pops.int/>
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](http://ec.europa.eu/food/fvo/specialreports/pesticide_residues/report_2001_en.pdf)
7. Food and Drug Administration (2002). Food and Drug Administration pesticide program - residue monitoring - 2001.  
<http://www.fda.gov/downloads/Food/FoodSafety/FoodContaminantsAdulteration/Pesticides/ResidueMonitoringReports/ucm126088.pdf>
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. CPA Guidance Residue Levels**

- This is not a list of recommended CPAs for tobacco. That is a matter for official and/or industry bodies in each country.
- GRLs have not yet been set for all CPAs registered for tobacco. Setting GRLs is an ongoing process based on a list of priorities decided by frequency of use and importance to leaf production.
- The presence of a compound does not imply endorsement by CORESTA.
- The entries in the list do not replace MRLs (maximum residue levels) set by the authorities. Compliance with MRLs is a legal requirement for countries that have set them for tobacco.

No.	CPA	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	0.10	Acephate	
4	Acetamiprid	2.50	Acetamiprid	
5	Acibenzolar-S-methyl	5.00	Acibenzolar-S-methyl	
6	Alachlor	0.10	Alachlor	
7	Aldicarb ( $\Sigma$ )	0.50	sum of Aldicarb, Aldicarb sulfoxide and Aldicarb sulfone, expressed as Aldicarb	
8	Aldrin + Dieldrin	0.02	Aldrin + Dieldrin	
9	Azinphos-ethyl	0.20	Azinphos-ethyl	
10	Azinphos-methyl	0.30	Azinphos-methyl	
11	Benalaxyl	2.00	Benalaxyl	
12	Benfluralin	0.06	Benfluralin	
13	Benomyl <sup>(a)</sup>		sum of Benomyl, Carbendazim, and Thiophanate-methyl expressed as Carbendazim	see Carbendazim
14	Bifenthrin	2.50	Bifenthrin	
15	Bromophos	0.04	Bromophos	
16	Butralin	5.00	Butralin	
17	Camphechlor ( $\Sigma$ ) (Toxaphene)	0.30	Camphechlor (mixture of chlorinated camphenes)	
18	Captan	0.70	Captan	
19	Carbaryl	0.50	Carbaryl	
20	Carbendazim <sup>(a)</sup>	2.00	sum of Benomyl, Carbendazim, and Thiophanate-methyl expressed as Carbendazim	
21	Carbofuran ( $\Sigma$ )	0.50	sum of Carbofuran and 3-Hydroxycarbofuran expressed as Carbofuran	
22	Chinomethionat	0.10	Chinomethionat	
23	Chlorantraniliprole	10.00	Chlorantraniliprole	
24	Chlordane ( $\Sigma$ )	0.10	sum of cis-Chlordane and trans-Chlordane	
25	Chlorfenvinphos ( $\Sigma$ )	0.04	sum of (E)-Chlorfenvinphos and (Z)-Chlorfenvinphos	

No.	CPA	GRL (ppm)	Residue definition	Notes
26	Chlorothalonil	2.00	Chlorothalonil	
27	Chlorpyrifos	0.50	Chlorpyrifos	
28	Chlorpyrifos-methyl	0.20	Chlorpyrifos-methyl	
29	Chlorthal-dimethyl	0.50	Chlorthal-dimethyl	
30	Clomazone	0.20	Clomazone	
31	Cyfluthrin ( $\Sigma$ )	2.00	Cyfluthrin (sum of all isomers)	
32	Cyhalothrin ( $\Sigma$ )	0.50	Cyhalothrin (sum of all isomers)	
33	Cymoxanil	0.10	Cymoxanil	
34	Cypermethrin ( $\Sigma$ )	1.00	Cypermethrin (sum of all isomers)	
35	DBCP	0.05	DBCP (1,2-dibromo-3-chloropropane)	
36	DDT ( $\Sigma$ )	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	
37	Deltamethrin <sup>(b)</sup>	1.00	sum of Deltamethrin and Tralomethrin expressed as Deltamethrin	
38	Demeton-S-methyl ( $\Sigma$ )	0.10	sum of Demeton-S-methyl, Oxydemeton-methyl (Demeton-S-methyl sulfoxide) and Demeton-S-methyl sulfone expressed as Demeton-S-methyl	
39	Diazinon	0.10	Diazinon	
40	Dicamba	0.20	Dicamba	
41	Dichlorvos <sup>(c)</sup>	0.10	sum of Dichlorvos, Naled and Trichlorfon expressed as Dichlorvos	
42	Dicloran	1.00	Dicloran	
43	Diflubenzuron	0.10	Diflubenzuron	
44	Dimefox	0.01	Dimefox	
45	Dimethoate <sup>(d)</sup>	0.50	sum of Dimethoate and Omethoate expressed as Dimethoate	
46	Dimethomorph ( $\Sigma$ )	2.00	sum of (E)-Dimethomorph and (Z)-Dimethomorph	
47	Dinocap ( $\Sigma$ )	0.60	sum of Dinocap isomers and Dinocap phenols expressed as Dinocap	Currently, Dinocap isomers expressed as Dinocap ( $\Sigma$ ) because Dinocap phenols standard is not available. Dinocap phenols should be also expressed as Dinocap ( $\Sigma$ ) when standard will be available.
48	Diphenamid	0.05	Diphenamid	
49	Disulfoton ( $\Sigma$ )	0.10	sum of Disulfoton, Disulfoton sulfoxide, and Disulfoton sulfone expressed as Disulfoton	
50	Dithiocarbamates (as CS <sub>2</sub> ) <sup>(e)</sup>	5.00	Dithiocarbamates expressed as CS <sub>2</sub>	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



No.	CPA	GRL (ppm)	Residue definition	Notes
				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.
51	Endosulfans ( $\Sigma$ )	1.00	sum of alpha- and beta-isomers and Endosulfan-sulphate expressed as Endosulfan	
52	Endrin	0.05	Endrin	
53	Ethoprophos	0.10	Ethoprophos	
54	Ethylene dibromide	0.05	Ethylene dibromide	
55	Famoxadone	5.00	Famoxadone	
56	Fenamiphos ( $\Sigma$ )	0.50	sum of Fenamiphos, Fenamiphos sulfoxide and Fenamiphos sulfone expressed as Fenamiphos	
57	Fenchlorphos	0.04	Fenchlorphos	
58	Fenitrothion	0.10	Fenitrothion	
59	Fensulfothion	0.04	Fensulfothion	
60	Fenthion ( $\Sigma$ )	0.10	sum of Fenthion, Fenthion sulfoxide and Fenthion sulfone expressed as Fenthion	
61	Fenvalerate ( $\Sigma$ )	1.00	Fenvalerate (sum of all isomers including Esfenvalerate)	
62	Fluazifop-butyl ( $\Sigma$ )	1.00	Fluazifop-butyl (sum of all isomers)	
63	Flucythrinate ( $\Sigma$ )	0.15	Flucythrinate (sum of all isomers)	
64	Flumetralin	5.00	Flumetralin	
65	Folpet	0.20	Folpet	
66	Fonofos ( $\Sigma$ )	0.05	Fonofos (sum of all isomers)	
67	Formothion	0.05	Formothion	
68	HCH ( $\alpha$ -, $\beta$ -, $\delta$ -)	0.05	HCH ( $\alpha$ -, $\beta$ -, $\delta$ -)	
69	HCH ( $\gamma$ -) (Lindane)	0.05	HCH ( $\gamma$ -) (Lindane)	
70	Heptachlor ( $\Sigma$ )	0.02	sum of Heptachlor and two Heptachlor epoxides (cis- and trans-) expressed as Heptachlor	
71	Hexachlorobenzene	0.02	Hexachlorobenzene	
72	Imidacloprid	5.00	Imidacloprid	
73	Indoxacarb ( $\Sigma$ )	15.00	Sum of S isomer + R isomer	

No.	CPA	GRL (ppm)	Residue definition	Notes
74	Iprodione (Σ)	0.25	sum of Iprodione and N-3,5-dichlorophenyl-3-isopropyl-2,4-dioxoimidazolyzin-1-carboxamide expressed as Iprodione	
75	Isopropalin	0.07	Isopropalin	
76	Malathion	0.50	Malathion	
77	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 CPAs, all efforts should be made to strictly follow label application rates, and use should be no more than necessary to achieve the desired effect.
78	Metalaxyl (Σ)	2.00	sum of all isomers including Metalaxyl-M / Mefenoxam	
79	Methamidophos	1.00	Methamidophos	
80	Methidathion	0.10	Methidathion	
81	Methiocarb (Σ)	0.20	sum of Methiocarb, Methiocarb sulfoxide, and Methiocarb sulfone expressed as Methiocarb	
82	Methomyl <sup>(n)</sup>	1.00	sum of Methomyl, Methomyl-oxim, and Thiodicarb expressed as Methomyl	
83	Methoprene	1.00	Methoprene	
84	Methoxychlor	0.05	Methoxychlor	
85	Mevinphos (Σ)	0.04	Mevinphos (sum E and Z isomers)	
86	Mirex	0.08	Mirex	
87	Monocrotophos	0.30	Monocrotophos	
88	Naled <sup>(c)</sup>		sum of Dichlorvos, Naled, and Trichlorfon expressed as Dichlorvos	see Dichlorvos
89	Nitrofen	0.02	Nitrofen	
90	Omethoate <sup>(d)</sup>		sum of Dimethoate and Omethoate expressed as Dimethoate	see Dimethoate
91	Oxadixyl	0.10	Oxadixyl	
92	Oxamyl	0.50	Oxamyl	
93	Parathion (-ethyl)	0.06	Parathion	
94	Parathion-methyl	0.10	Parathion-methyl	
95	Pebulate	0.50	Pebulate	
96	Penconazole	1.00	Penconazole	
97	Pendimethalin	5.00	Pendimethalin	
98	Permethrin (Σ)	0.50	Permethrin (sum of all isomers)	

No.	CPA	GRL (ppm)	Residue definition	Notes
99	Phorate	0.10	Phorate	
100	Phosalone	0.10	Phosalone	
101	Phosphamidon ( $\Sigma$ )	0.05	Phosphamidon (sum of E and Z isomers)	
102	Phoxim	0.50	Phoxim	
103	Piperonyl butoxide	3.00	Piperonyl butoxide	
104	Pirimicarb	0.50	Pirimicarb	
105	Pirimiphos-methyl	0.10	Pirimiphos-methyl	
106	Profenofos	0.10	Profenofos	
107	Propoxur	0.10	Propoxur	
108	Pymetrozine	1.00	Pymetrozine	
109	Pyrethrins ( $\Sigma$ )	0.50	sum of Pyrethrins 1, Pyrethrins 2, Cinerins 1, Cinerins 2, Jasmolins 1 and Jasmolins 2	
110	Tefluthrin	0.10	Tefluthrin	
111	Terbufos ( $\Sigma$ )	0.05	sum of Terbufos, Terbufos sulfoxide and Terbufos sulfone expressed as Terbufos	
112	Tetrachlorvinphos	0.10	Tetrachlorvinphos	
113	Thiamethoxam	5.00	Thiamethoxam	
114	Thiodicarb <sup>(f)</sup>		sum of Methomyl, Methomyl-oxim, and Thiodicarb expressed as Methomyl	see Methomyl
115	Thionazin	0.04	Thionazin	
116	Thiophanate-methyl <sup>(a)</sup>		sum of Benomyl, Carbendazim, and Thiophanate-methyl expressed as Carbendazim	see Carbendazim
117	Tralomethrin <sup>(b)</sup>		sum of Deltamethrin and Tralomethrin expressed as Deltamethrin	see Deltamethrin
118	Trichlorfon <sup>(c)</sup>		sum of Dichlorvos, Naled, and Trichlorfon expressed as Dichlorvos	see Dichlorvos
119	Trifluralin	0.10	Trifluralin	
120	Vamidotion ( $\Sigma$ )	0.05	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, Polycarbamate, 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.

