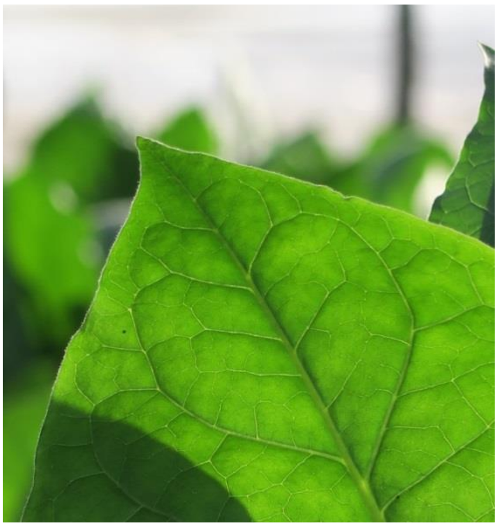
Cooperation Centre for Scientific Research Relative to Tobacco

Agro-Chemical Advisory Committee

CORESTA Guide N° 21

Cigar Tobacco: Best Practices, Crop Protection and CPA Guidance Residue Levels



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Cigar Tobacco: Best Practices, Crop Protection and CPA Guidance Residue Levels

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Abstract

Some important aspects of Good Agricultural Practice (GAP) with regard to crop protection in cigar tobacco are different from the tobaccos used in other manufactured tobacco products, mainly cigarettes. This is due to the fact that any damage, whether mechanical or physiological, significantly depreciates the value of leaves to the extent that they no longer meet market requirements. This applies especially to cigar wrapper leaves. It is therefore necessary to take this into account when setting Guidance Residue Levels (GRL) specifically for this type of tobacco.

This Guide outlines both the production and crop protection practices that denote the difference between cigar and other tobaccos and provides guidance on critical best practice for managing Crop Protection Agents (CPAs). The Guide also contains cigar tobacco Guidance Residue Levels (C-GRLs) that are based on data obtained from a series of field trials measuring residues in cigar tobacco crops managed according to GAP in countries across the globe. The cigar tobacco Guidance Residues Levels complement those for tobaccos used in cigarettes and some other manufactured tobacco products listed in CORESTA Guide No. 1 [“The Concept and Implementation of CPA Guidance Residue Levels”].

Introduction

Protecting crops from damage by weeds, pests, and diseases to prevent loss of yield and quality is essential for sustainable production, provided it is practiced according to Good Agricultural Practice (GAP) guidelines, including Integrated Pest Management (IPM). Tobacco is no different from other crops in this respect.

The guidelines for GAP and sustainable production for tobacco are described in CORESTA Guides No. 3 [“Good Agricultural Practices (GAP) Guidelines”] and No. 17 [“Sustainability in Leaf Tobacco Production”], respectively.

Good agricultural practices are those implemented to ensure sustainable, economically viable production of usable tobacco and can be defined as *“agricultural practices which produce a quality crop while protecting, sustaining or enhancing the environment with regard to soil, water, air, animal and plant life.”*

The concepts of GAP apply to all crops, including tobacco and its types, but the specifics vary between them depending on where and how they are grown, and for what purpose and market requirements, such as cigarettes, cigars, and smokeless tobacco.

In the case of cigar tobaccos, the tobacco types and cultural practices adopted differ substantially from the ones utilized for the other tobaccos because the wrapper is the visible part of a cigar, physical quality considerations for cigar wrapper tobaccos are much more stringent than for other leaf usage.

Value is severely penalized by any form of damage. Consequently, crop protection practices for cigar tobaccos may vary significantly from those advocated by GAP applicable to other tobacco types.

Tobacco leaves are produced for different final products such as cigarettes, cigars and smokeless tobacco. In the case of cigar tobaccos, the tobacco types and cultural practices adopted differ substantially from the ones utilized for the other tobaccos. Crop protection, being an essential part of GAP, also differs noticeably (in accordance with market requirements) as a consequence of the final utilization of the tobacco produced.

The production of certain cigar tobaccos, particularly wrapper tobacco types, often utilizes certain GAPs that are significantly different from most traditional cigarette tobacco production practices. One of these differences is the economic threshold for CPA application. Due to the high relative economic value of wrapper tobaccos, their corresponding economic threshold levels are extremely low which requires a more dedicated GAP programme for disease and pest management.

The objective of this Guide are: 1) to describe the various tobacco components of cigars and their crop production practices and protection strategies, with the intention that they be linked to CPA management strategies that aim at minimizing residues and, 2) define specific Cigar Guidance Residue Levels (C-GRLs).

This document is structured to address cigar tobacco practices in the first place, followed by a dedicated section on crop protection.

Background to Cigar Tobacco Production

Quality and price of cigar leaves depend much more on being blemish-free than are tobacco leaves used in other manufactured tobacco products. Protection in the field from fungal and insect damage is therefore of the utmost importance to cigar tobacco producers, particularly for cigar wrapper. As with all types of tobacco, Integrated Pest Management (IPM) is a fundamental requirement of GAP, and this must be in place from the outset. Because any form of leaf blemish results in severe price penalties, the threshold that determines when control is necessary for economic reasons is significantly lower than for other tobaccos. As a result, protection of cigar leaves from damage is mainly preventative rather than curative. CPAs need to be applied before pests or diseases can become established and cause any damage, in contrast to the curative approach feasible when threshold levels are higher.

Cigar tobacco is typically used in the following ways:

Wrapper

- The outer covering of a cigar that is usually required to be uniform and blemish-free
- Hand applied natural leaf
- Machine applied die-cut and bobbinized natural leaf or reconstituted / homogenized manufactured wrapper material

Binder

- Used to hold together the filler
- Can come from wrapper production or filler production
- Must be a sound leaf in order to channel the smoke

Long filler

- Used in premium cigars
- Made into frog-strips (midrib partially removed)
- Made into hand-strips (midrib completely removed)

Short filler

- Threshed tobacco or bits/pieces (expanded or not) from long filler hand processing
- Used mainly in machine made cigars

In the case of wrapper, binder, and long filler, it is important to point out that leaves are processed, sold, and used to make cigars, especially premium cigar products, on an individual leaf basis rather than in bulk as other tobacco types are processed.

Filler tobacco is usually produced in crops dedicated for this purpose. Binder leaves are either those considered unsuitable for use as wrapper in crops grown for wrapper or are the better leaves from filler crops. To produce the desired style from each crop, cultural practices in crops for wrapper production are different in some respects from those for filler.

Production Practices for Cigar Wrapper

Cigars are judged by their taste, aroma, and appearance.

In order to make a "perfect" leaf for wrapper, producers must use practices in the field and subsequent handling techniques that ensure leaves are free of damage. Damage to a wrapper leaf is the result of anything that causes it to be blemished or have a hole. This includes fungal spots, insect holes, natural causes (sunscald and weather fleck), human causes (breaks), nutrient problems, and/or phytotoxicity from CPAs.

GAP in wrapper production is designed to ensure a "perfect leaf" available from seedling production through harvesting and curing.

Common GAP for wrapper includes:

Farming systems

- Mostly large estate or corporate farms (e.g. Nicaragua, Honduras and Mexico)
- Some small scale (e.g. in Cameroon, Indonesia and Cuba)

Because of the high cost of production and the level of expertise required, a very large proportion of wrapper is grown on the large estates. This requires a high level of skills and the support of well-trained agronomists and technicians. Furthermore, after harvesting and curing, cigar tobaccos are fermented multiple times and potentially aged for several years, depending on customer requirements. This delay in return on investment can normally only be afforded by relatively large operations.

Varieties

- Varieties are selected and used to give the market what it desires, i.e. colour / taste.
- There are very few disease-resistant varieties. However, breeding programmes are under way to develop resistance while maintaining yield and the desired quality. The criteria for quality of leaves ready for marketing are their colour, size, shape, taste, and body. This has more to do with the selection of wrapper variety grown and the way it is managed than with its yield or disease resistances.

Field requirements

Most wrapper leaves in general are required to be relatively thin, have elasticity, and luster. For the lighter coloured wrappers, the crop is grown under artificial shade (cloth) or in areas where cloudy weather predominates and not in full sunlight. Where shade cloth is used, the cost of the structure and the need to move it annually to meet rotational requirements adds significantly to the cost of production. Darker wrapper is grown in full sun and may not be topped. Its leaves are more bodied than those from the shade-grown crops. To ensure that growth is not restricted and therefore quality compromised, supplementary irrigation is often necessary. Irrigation needs to be carefully controlled because of the crop's sensitivity to both drought stress and over-watering. Drip (trickle flow) irrigation, often combined with fertigation, is common in the large operations.

Fertilization

Fertilization is also closely controlled. All essential nutrients need to be available during growth and the fertilizers that supply these need to be of a high, reliable quality. Both inorganic and organic sources are commonly used. Actual rates applied and times of application depend on local soil conditions.

Potassium is often applied at higher rates compared with other tobacco types because of its positive influence on burn quality. Magnesium is also considered necessary to ensure a desired white ash in the burn.

Cultural practices

The removal and disposal of bottom leaves is very common in cigar tobacco. This can benefit the crop in several ways, such as removal of a source of fungal spores and improved airflow around the plant / soil to reduce conditions conducive to disease development. These leaves, which have no commercial value, are routinely removed and destroyed by burying to avoid transfer of disease organisms to the remaining crop.

Growing the crop on ridges and subsequent ridging up are standard practices to promote root development, for weed control and, in the case of surface irrigation, to provide the necessary furrows.

Crops for most types of wrapper are not topped in order to retain the particular quality criteria for this type.

Harvesting

In primed cigar tobaccos, the lower leaves are ready for harvesting about 60 days after planting. They are harvested to achieve optimal quality, to enable uniform curing and facilitate subsequent handling. Between one to three leaves are normally removed at a time. Wrapper is harvested by hand and the whole operation from harvesting, transport and filling of barns is done with special care to avoid any mechanical damage. Leaves less than about 40 cm long have limited commercial value and may be discarded at harvest. The harvesting cycle can be as frequent as every two to three days, depending on weather conditions, and only once for stalk-cut harvested tobaccos.

Besides priming, there are a few tobacco types that are stalk-cut and leaves used for wrapper, such as some of the Pennsylvania dark air-cured (DAC) types, Connecticut broad leaf, some dark fire-cured (DFC) types, etc.

Curing

Curing is the second most important aspect of wrapper production after producing "perfect" blemish-free leaves in the field. Curing typically takes place in large well-constructed, expensive barns. To achieve uniform, optimal quality leaves, temperature and humidity in barns are controlled by ventilation and, in most cases, by supplemental heat. Constant supervision is required during the colour setting phase. Decisions to adjust conditions are often made every hour. The curing process takes 25-45 days, depending on conditions and style of leaf.

Fermentation

After curing and conditioning, the tobacco is fermented to achieve the desired depth of colour and aroma in dedicated fermentation structures. The process takes about 40 days for "blond" and up to 8 months for "dark" wrapper. During this process the leaves are turned several times to achieve a uniform result. Decisions on turning a pile are made according to temperature readings inside the pile or the number of days since it was last turned (in case of no temperature increase).

Sorting

After fermentation, the leaves are individually sorted into quality grades according to size, colour and general appearance in preparation for marketing.

Production Practices for Cigar Filler

There are two distinct markets for cigar filler: long filler for premium cigars and short filler for machine made / mass market cigars. Production practices can be quite different for the two types of filler.

Long filler

Even though cigar filler is not visible (being placed in the inside of the cigar), the long filler market discriminates against damaged leaves. Sound, whole leaves are preferred for premium cigars to enable uniform bunching in the manufacturing process of long filler cigars. This ensures that the individual leaves can be placed as uniformly as possible in the bunch preparatory to binding. Broken leaves or leaves with holes make this difficult to achieve. As with cigar wrapper, cigar filler needs to be kept clean of fungal spots and free of damage (holes). There is a price difference between a broken and a sound long filler. With this price difference in mind, long filler growers also use a proactive approach with CPAs and many production practices are similar to those for cigar wrapper.

GAP in long filler production is based on doing everything possible to ensure that many sound, whole leaves are available at harvest.

GAP for filler production differs from wrapper in the following respects:

Field requirements

Filler does not need to be grown under shade. It is normally grown in heavy soils with high organic matter content, which produces the heavier textured long filler preferred by many cigar manufacturers.

Fertilization

To produce the more bodied style required for long filler, growers typically use only mineral fertilizers, which are readily available to the plants in preference to applying slow-releasing organic fertilizers.

Topping and suckering

Plants are commonly topped and the suckers that subsequently emerge are removed to achieve the bodied nature of this style of cigar tobacco. Topping is done by hand and suckercides, also normally applied by hand, are used to assist in sucker control.

Curing

- Curing structures range from small open-sided, palm thatched roofs to full wood-sided barns with metal roofs.

Curing long filler production is relatively simple compared to most wrapper tobaccos. It is air-cured with limited control of conditions in the barn, normally only ventilation doors and vents. Sometimes supplemental heating may be required to avoid barn rot. The curing period varies from 45 to 60 days.

Fermentation

- Most growers under contract do not ferment their tobacco. It is normally done by the purchasing company.
- It takes 3 to 4 months for thinner, lower stalk filler and upwards to 8 months for heavier, upper stalk tobacco.
- Piles are "turned" when time or desired temperatures are achieved.
- Higher temperatures than for some wrapper styles are usually allowed.

Fermentation is very important in long filler tobacco. This process removes the sharpness and improves the taste of the smoke.

Short filler

Short filler is tobacco that is used typically in a cut or threshed form in cigars. Targeted production of short filler tobaccos is normally grown by small scale farmers with minimal inputs, such as fertilizers or CPAs. The market for this type of cigar tobacco allows for a higher degree of broken/damaged leaves. Short filler may be grown under contract for a company, but many local free-markets also exist.

Crop Protection for Cigar Tobacco

Because quality requirements are very specific for cigar tobaccos, especially in terms of their appearance and physical integrity, crop protection is particularly important. This applies most to the wrapper styles of the product. Therefore, GAP for crop protection for cigar tobaccos differ in scale from those applied in the other tobacco types used predominantly for cigarettes (refer to CORESTA Guide No. 1 and CORESTA Guide No. 3).

Note: It is important that Crop Protection Agents are used responsibly. They are toxic to humans and animals to a greater or lesser extent, can harm the environment and pollute water resources. Refer to CORESTA Guide No. 19 "Responsible Use of Crop Protection Agents (CPAs) in Tobacco Leaf Production".

Pests and Diseases of Cigar Tobaccos

Identity and knowledge of pest

At the outset, it is necessary to have a good knowledge of the pests and diseases that could affect the tobacco crop. This involves proper identification, and understanding their life cycles, when they are most likely to infest the crop, the environment most conducive to infestation and the type of damage they inflict. Then, for the purpose of control and selection of appropriate CPAs whether, in the case of insects for example, their feeding habit is by chewing or sucking.

Practical steps to minimize infestation

- Rotation with crops not susceptible to the soil borne diseases and pests of tobacco.
- Colour traps for insects.
- Physical barriers provided by shade cloth enclosing the entire field crop.
- Removal of lower stalk leaves to improve air circulation.
- Utilizing currently available varieties resistant to one or more of the pathogens found locally.

Crop Protection Agents (CPAs) for tobacco

1. Identify all the locally approved CPAs suitable for controlling the identified pests and diseases.
2. Select those with good efficacy and lowest toxicity. Give preference to bio-pesticides and adhere to CPA labels.
3. Rotate CPAs by selecting more than one mode of action available for each type of treatment in order to minimize resistance by the pest and accumulation of residues of the same CPA.
4. Store all CPAs securely in a locked, confined building.
5. Obtain most appropriate Personal Protection Equipment (PPE) and ensure that it is in good condition and properly used when required.
6. Use appropriate application equipment that ensures efficient and effective application, taking into account possible environmental impacts, as well as applicator and bystander exposure.
7. Define a CPA application schedule for spraying operations for each crop, bearing in mind that more than one crop may be grown in succession and that conditions for infestation may be different from one crop to the next. Also, bear in mind that cigar tobaccos require preventative measures to control the pests and diseases that damage the leaves and render them unsuitable for market requirements.
8. In defining the schedule, place those CPAs in the lowest toxicity classes and with the lowest residue potential (often the shorter pre-harvest interval [PHI] products) towards the end of the crop cycle to minimize residues and the type of residue.
9. Treat the crop only when absolutely necessary. When conditions are such that infestation is unlikely, omit that part of the schedule.
10. Routinely scout for pests and incidence of disease to confirm that the schedule is on track and to ensure that additional pests and diseases are taken into account.

Effective crop protection is essential for sustainable crop production. CPAs have an important role in this respect in the context of Integrated Pest Management. Even though the aim is to achieve the "perfect" cigar tobacco leaf and the desired yield, every effort should be made to use CPAs responsibly with the objective of minimizing the amount and type of residues and any other negative effects of their use on persons, animals and the overall environment.

Cigar Tobacco Guidance Residue Levels

C-GRLs (Table 1) have been developed by the CORESTA Agro-Chemical Advisory Committee (ACAC), to provide guidance to cigar tobacco growers and those in the cigar tobacco industry interested in the application of Crop Protection Agents (CPAs) and the implementation of GAP in tobacco production.

C-GRLs are intended to assist with the interpretation and evaluation of CPA residue testing results originated from crop protection programmes. They also serve as the starting point for the identification and implementation of programmes specifically defined for the minimization of CPA residues in cigar tobacco and to achieve efficient pest and disease control required to produce the quality and yield expected.

The CPAs considered and the C-GRLs were obtained from a series of field trials measuring residues in cigar tobacco in crops managed according to GAP in countries growing cigar tobacco across the globe.

The C-GRLs list does not necessarily include every CPA authorised for use on tobacco in some places in the world. Exclusion of a particular CPA from the list of C-GRLs does not mean that its use is unacceptable when used according to its regulatory label. At the same time, inclusion of a particular CPA in the list of C-GRLs does not mean that its use is specifically endorsed.

C-GRLs do not replace requirements to comply with regulations, either on the use of CPAs, or with regard to residue levels that may be detected. C-GRLs are designed to emphasise the importance of GAP for growing quality cigar tobacco.

Use of Cigar Tobacco Guidance Residue Levels

The C-GRLs assist, but are not absolute, in verifying that the CPAs from a crop protection programme were used in a way that results in residues below the respective values. The number of applications, the quantity per application, the application placements in the field stage and the PHI are essential factors contributing to the accumulation of residues. By adjusting these factors it is possible to reduce CPA residue levels.

With the C-GRLs and an analytical scheme in place, it is possible to evaluate if a given crop protection programme is effective in reducing residues to levels below a benchmark and consequently, to implement program adjustments to continually reduce overall CPA residues in cigar tobaccos.

The C-GRLs are only the starting point to comprehensively address the importance of implementing targeted GAP principles related to CPA usage in cigar tobacco production and to support CPA residue management initiatives already in place in several cigar tobacco producing countries worldwide.

Besides residues, other important integrity aspects must be addressed in cigar tobacco production, such as the availability of registered CPAs for tobacco crops and the elimination of Highly Hazardous Pesticides (HHPs) from crop protection programmes.

Acknowledgements

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Photos courtesy of Marco Prat – JT International Germany GmbH

References

Wehlburg, A.F (1999). Cigar and Cigarillos – Tobacco Production, Chemistry and Technology in “Tobacco – Production, Chemistry and Technology”, D. Layten Davis and Mark T. Nielsen

Table 1. CPA Cigar Guidance Residue Levels (C-GRLs)

- **The C-GRLs were obtained from a series of field trials measuring residues in cigar tobacco in crops managed according to GAP in countries growing cigar tobacco across the globe.**
- **The C-GRLs assist, but are not absolute, in verifying that the CPAs from a crop protection programme were used in a way that results in residues below the respective values.**
- **The C-GRLs are the benchmark and the starting point for the implementation of crop protection programmes able to minimize the CPA residues content in cigar tobacco**

No.	CPA	C-GRL (ppm)	Residue definition	Notes
1	Abamectin	6	Sum of avermectin B1a, avermectin B1b expressed as Abamectin	
2	Acephate	0.04	Acephate	
3	Acetamiprid	27	Acetamiprid	
4	Acibenzolar-S-methyl	0.09	Acibenzolar-S-methyl	
5	Ametoctradin	0.09	Ametoctradin	
6	Azadirachtin	0.09	Azadirachtin	
7	Azoxystrobin	27	Azoxystrobin	
8	Benomyl		Sum of Benomyl, Carbendazim, and Thiophanate-methyl expressed as Carbendazim	See Carbendazim
9	Benthiovalicarb-isopropyl	14	Benthiovalicarb-isopropyl	
10	Benzovindiflupyr	9	Benzovindiflupyr	
11	Bifenthrin	9	Bifenthrin	
12	Boscalid	52	Boscalid	
13	Carbendazim (Sum)	42	Sum of Benomyl, Carbendazim, and Thiophanate-methyl expressed as Carbendazim	
14	Chlorantraniliprole	51	Chlorantraniliprole	
15	Chlorothalonil	20	Chlorothalonil	
16	Clomazone	0.2	Clomazone	
17	Cyantraniliprole	21	Cyantraniliprole	
18	Cyazofamid	10	Cyazofamid	
19	Cyfluthrin (Sum)	3	Cyfluthrin (Sum of all isomers)	
20	Cyhalothrin (Sum)	14	Cyhalothrin (Sum of all isomers)	
21	Cymoxanil	0.05	Cymoxanil	
22	Cypermethrin (Sum)	23	Cypermethrin (Sum of all isomers)	
23	Deltamethrin	3	Sum of Deltamethrin and Tralomethrin expressed as Deltamethrin	
24	Diazinon	0.07	Diazinon	
25	Difenoconazole	29	Difenoconazole	
26	Diflubenzuron	74	Diflubenzuron	
27	Dimethomorph (Sum)	33	Sum of (E)-Dimethomorph and (Z)-Dimethomorph	
28	Dithiocarbamates (as CS_2)	21	Dithiocarbamates expressed as CS_2	
29	Ethoprophos	0.04	Ethoprophos	

No.	CPA	C-GRL (ppm)	Residue definition	Notes
30	Etridiazole	0.02	Etridiazole	
31	Fenamidone	30	Fenamidone	
32	Fenpropathrin	3	Fenpropathrin	
33	Flubendiamide	59	Flubendiamide	
34	Flumetralin	5	Flumetralin	
35	Fluopicolide	22	Fluopicolide	
36	Flupyradifurone	27	Flupyradifurone	
37	Flutriafol	4.0	Flutriafol	
38	Folpet	56	Folpet	
39	Fosetyl-Al	75	Sum of fosetyl, phosphonic acid and their salts, expressed as fosetyl	
40	Hymexazol	0.09	Hymexazol	
41	Imidacloprid	21	Imidacloprid	
42	Indoxacarb (Sum)	15	Sum of S isomer + R isomer	
43	Lufenuron	15	Lufenuron	
44	Maleic hydrazide	72	Maleic hydrazide (free and bounded form)	
45	Mandipropamid	32	Mandipropamid	
46	Matrine	21	Matrine	
47	Metaflumizone (Sum)	18	Sum of E- and Z- isomers	
48	Metalaxyl (Sum)	7	Sum of all isomers including Metalaxyl-M / Mefenoxam	
49	Methomyl (Sum)	18	Sum of Methomyl, Methomyloxim, and Thiodicarb expressed as Methomyl	
50	Novaluron	40	Novaluron	
51	Oxamyl	0.09	Oxamyl	
52	Oxathiapiprolin	4	Oxathiapiprolin	
53	Pencycuron	15	Pencycuron	
54	Pendimethalin	0.02	Pendimethalin	
55	Picoxystrobin	1.2	Picoxystrobin	
56	Profenofos	11	Profenofos	
57	Propamocarb	30	Propamocarb	
58	Propiconazole (Sum)	37	Sum of all isomers	
59	Pymetrozine	2	Pymetrozine	
60	Pyraclostrobin	38	Pyraclostrobin	
61	Quizalofop (Sum)	0.09	Sum of quizalofop and quizalofop-ethyl	
62	Spinetoram	4	Spinetoram	
63	Spinosad	18	Spinosad	
64	Spirotetramat (Sum)	12	Sum of spirotetramat and spirotetramat-enol	
65	Sulfentrazone	0.09	Sulfentrazone	
66	Sulfoxaflor	10	Sulfoxaflor	
67	Tebuconazole	24	Tebuconazole	
68	Teflubenzuron	41	Teflubenzuron	
69	Thiacloprid	5	Thiacloprid	

No.	CPA	C-GRL (ppm)	Residue definition	Notes
70	Thiamethoxam	14	Thiamethoxam	
71	Thiamethoxam (Sum)	22	Sum of Thiamethoxam and Clothianidin	
72	Thiocyclam	0.09	Thiocyclam	
73	Thiodicarb		Sum of Methomyl, Methomyloxim, and Thiodicarb expressed as Methomyl	See Methomyl
74	Thiophanate-methyl		Sum of Benomyl, Carbendazim, and Thiophanate-methyl expressed as Carbendazim	See Carbendazim
75	Tralomethrin		Sum of Deltamethrin and Tralomethrin expressed as Deltamethrin	See Deltamethrin
76	Trifloxystrobin	15	Trifloxystrobin	