AGP: CP/100

FAO SPECIFICATIONS
FOR PLANT PROTECTION PRODUCTS

DICHLORPROP + MCPA

Food and Agriculture Organization of the United Nations
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Group on Pesticide Specifications

FAO Panel of Experts on Pesticide Specifications, Registration Requirements and Application Standards

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DISCLAIMER [1]

FAO specifications are developed with the basic objective of promoting, as far as practicable, the manufacture, distribution and use of pesticides that meet basic quality requirements.

Compliance with the specifications does not constitute an endorsement or warranty of the fitness of a particular pesticide for a particular purpose, including its suitability for the control of any given pest, or its suitability for use in a particular area. Owing to the complexity of the problems involved, the suitability of pesticides for a particular purpose and the content of the labelling instructions must be decided at the national or provincial level.

Furthermore, pesticides which are manufactured to comply with these specifications are not exempted from any safety regulation or other legal or administrative provision applicable to their manufacture, sale, transportation, storage, handling, preparation and/or use.

FAO disclaims any and all liability for any injury, death, loss, damage or other prejudice of any kind that may arise as a result of, or in connection with, the manufacture, sale, transportation, storage, handling, preparation and/or use of pesticides which are found, or are claimed, to have been manufactured to comply with these specifications.

Additionally, FAO wishes to alert users to the fact that improper storage, handling, preparation and/or use of pesticides can result in either a lowering or complete loss of safety and/or efficacy.

FAO is not responsible, and does not accept any liability, for the testing of pesticides for compliance with the specifications, nor for any methods recommended and/or used for testing compliance. As a result, FAO does not in any way warrant or represent that any pesticide claimed to comply with a FAO specification actually does so.

[1] This disclaimer applies to all specifications published by FAO.

INTRODUCTION TO FAO SPECIFICATIONS DEVELOPED UNDER THE OLD PROCEDURE

Between 1975 and 2000, FAO published booklets of specifications for technical materials and related formulations of plant protection products. Revisions of, and additions to, already published specifications will be issued when necessary. However, all changes and revisions of FAO specifications are now subject to the new procedure described in the *Manual on the development and use of FAO and WHO Specifications for Plant Protection Products*, FAO Plant Production and Protection Paper No. 173, Rome 2002 (*Revised First Edition* available only on the FAO home page of the Internet at: http://www.fao.org/ag/agp/agpp/pesticid/)

FAO specifications developed under the old procedure are based on the requirements defined in the Fourth Edition of the *Manual on the development and use of FAO specifications for plant protection products*, Plant Production and Protection Paper No. 128, Rome 1995.

This manual contained detailed definitions and other essential background information on basic procedures and technical principles adopted by the group on Pesticide Specifications of the FAO Panel of Experts on Pesticide Specifications, Registration Requirements, Application Standards and Prior Informed Consent, such as:

1. Categories of Specifications

   FAO Tentative Specifications (Code 'S/T', formerly 'ts') are those which have been recommended by FAO as preliminary specifications and which are based on minimum requirements. The methods of analysis cited are normally supplied by the manufacturer or may already have been published or be the subject of collaborative work.

   FAO Provisional Specifications (Code 'S/P', formerly 'S') are those for which more evidence of the necessary parameters is available and where some collaborative study of the methods of analysis has been carried out.

   FAO (full) Specifications (Code 'S/F', formerly 'S').
   Specifications that have all necessary requirements together with CIPAC (full) methods, or other collaboratively studied (proven) methods.[2, 3]

   Wherever possible, standards for apparatus and common names for pesticides are those approved by the International Organization for Standardization (ISO).

2. Expression of active ingredient content

   - for solids, liquid technical materials, volatile liquids (of maximum boiling point 50 °C) and viscous liquids (with minimum kinematic viscosity of 1×10^3 m^2/s at 20 °C) the FAO Specification shall be based on expression of the content as g/kg;

- for all other liquids the active ingredient content of the product shall be declared in terms of g/kg *or* g/l at 20 °C. If the customer requires both g/kg *and* g/l at 20 °C, then in case of dispute the analytical results shall be calculated as g/kg.

3. Tolerance on content

A declared content of active ingredient must be included in all specifications, and one of the problems immediately arising is the level of tolerance acceptable about the nominal figure. The tolerance is influenced by (a) the reproducibility of the method of analysis, (b) the sampling error and (c) the manufacturing variance.

Allowable variations in analytical results (i.e. tolerances in content of active ingredient) with respect to specific pesticide consignments are intended to cover reasonable variations in the contents of active ingredients. For examples of such tolerances, see the table in Section 4.2.7 of the Manual.

4. Containers/packaging

FAO guidelines are in preparation.

Containers shall comply with pertinent national and international transport and safety regulations.

Technical materials, dustable powders and granules

Containers shall be suitable, clean, dry and as specified, and shall not adversely affect, or be affected by, the contents, but shall adequately protect them against external conditions.

Wettable powders

The product shall be packed in suitable, clean, dry containers as specified in the order. The container shall provide all necessary protection against compaction, atmospheric moisture, loss by vaporization and/or contamination to ensure that the product suffers no deterioration under normal transit and storage conditions.

The product shall be protected by an adequate moisture barrier. This may be a suitable bag of polyethylene or alternative means of giving equal or better protection.

Solutions and emulsifiable concentrates

Containers shall be lined, where necessary, with a suitable material, or the interior surfaces shall be treated to prevent corrosion and/or deterioration of the contents.

Additional information should be given in all specifications where particular pesticides present problems in packaging.

5. Biological information

Phytotoxicity

No test can be specified to cover the possible phytotoxicity of a formulation to all crops. When a crop is not mentioned in the instructions for use, purchasers should check with the supplier that the material is suitable, always provided that such a use is not restricted or legally forbidden.

Wetting of crops

The dilute spray should satisfactorily wet the leaves of the specified crops when used in accordance with the instructions. Test method MT 53.2, CIPAC F, p.162, may be useful.

[1] *Should national pesticide specifications developed from these approved FAO specifications deviate from them, the National Authority responsible for making such changes is requested to inform the FAO Plant Protection Service of the nature of, and the reasons for, the modifications.*

[2] *Methods of analysis and miscellaneous techniques referred to in these specifications have been developed and adopted by CIPAC (Collaborative International Pesticides Analytical Council Ltd.). See CIPAC Handbooks 1 (1970), 1A (1980), 1B (1983), 1C (1985), D (1988), E(1993), CIPAC Proceedings 1980 and 1981, obtainable from Black Bear Press Limited, King's Hedges Road, Cambridge CB4 2PQ, England. The page numbers of specific methods are given in parentheses in the specifications. Copies of methods not yet published can be obtained from the FAO Plant Protection Service.*

[3] *Information on standard waters for laboratory evaluation of pesticidal formulations will be found in CIPAC Monograph 1,* Standard Waters and an FAO Survey on Naturally Occurring Waters *(1972), Black Bear Press Limited, King's Hedges Road, Cambridge CB4, England.*

SUBMISSION OF DRAFT SPECIFICATIONS TO FAO

Any organization, commercial firm or interested individual is encouraged to submit relevant specifications, or proposals for revision of existing specifications, for pesticide products for consideration and possible adoption by FAO. Correspondence should be addressed to the Pesticide Management Group, Plant Production and Protection Division, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy.

General guidelines on preparing draft specifications are given in the *Manual on the development and use of FAO and WHO Specifications for Plant Protection Products*, FAO Plant Production and Protection Paper No. 173, Rome 2002 (Revised First Edition available only on the FAO home page of the Internet at: http://www.fao.org/ag/agp/agpp/pesticid/).

Specifications which are considered suitable for further processing are assigned priorities and circulated to appropriate organizations and specialists to comment. Comments, together with other relevant information, are then reviewed in detail by the Group on Specifications of the FAO Panel of Experts on Pesticide Specifications, Registration Requirements, Application Standards and Prior Informed Consent. The drafts are converted into FAO Provisional Specifications, or full FAO Specifications.

INFORMATION

COMMON NAME:	DICHLORPROP
CIPAC CODE NO:	84
EMPIRICAL FORMULA:	$C_9H_8Cl_2O_3$
RMM:	235.1

CHEMICAL NAMES:

Dichlorprop is the ISO name for (±)-2-(2,4-dichlorophenoxy) propionic acid (IUPAC); (±)-2-(2,4-dichlorophenoxy)propanoic acid (CA; Registry No. 120-36-5)

COMMON NAME:	MCPA
CIPAC CODE NO:	2
EMPIRICAL FORMULA:	$C_9H_9ClO_3$
RMM:	200.6

CHEMICAL NAMES:

MCPA is the ISO common name for 2-(4-chloro-o-tolyloxy)acetic acid (IUPAC); 2-(4-chloro-2-methylphenoxy)acetic acid (CA; Registry No. 94-74-6).

DICHLORPROP + MCPA SALT AQUEOUS SOLUTIONS

FAO Tentative Specification October 1983
(84.1+2.1/SL/ts/-)

.1 DESCRIPTION

The product shall consist of dichlorprop and MCPA (complying with the respective FAO Provisional Specifications October 1983) as the active ingredients formulated as a dichlorprop + MCPA salt aqueous solution. It shall be free from visible suspended matter or sediment.

.2 ACTIVE INGREDIENT

.2.1 Salt(s)

The names of the dichlorprop and MCPA salt(s) present shall be stated (Note 1).

.2.2 Identity tests (CIPAC 1C, p. 2087, p. 2142)

Where the identity of the active ingredients is in doubt the extractable acids shall comply with any two of the following tests:

.2.2.1 GLC

The major components in the sample chromatogram shall have the same relative retention times as those from a standard dichlorprop and MCPA chromatographed under identical conditions.

.2.2.2 TLC

The major component in the sample chromatogram shall have the same Rf value as those from a standard dichlorprop and MCPA.

.2.2.3 HPLC

The major components in the sample chromatogram shall have the same retention times as those from a standard dichlorprop and MCPA chromatographed under identical conditions.

.2.3 Extractable acids (CIPAC 1C, p. 2087, p. 2142)

The extractable acid content expressed as dichlorprop shall be not more than $1.11x + 1.34y$ where x is the content of dichlorprop and y is the content of MCPA found under .2.4 (Note 2).

.2.4 Dichlorprop and MCPA (CIPAC 1C, p. 2087, p. 2142)

The nominal dichlorprop and MCPA contents (g/l at 20 C or g/kg; Note 3) shall be declared and when determined the content obtained shall differ from that declared by not more than +/- 7.5% of the declared content.

.3 IMPURITIES[2]

.3.1 Free phenols

Maximum: (1.5x + l.0y)% (Note 4) expressed as 2,4-dichlorophenol (Note 5), where x and y are the dichlorprop and MCPA contents found under .2.4 (Note 6).

.3.2 Water insolubles

The product shall pass through a 250 µm test sieve and not more than 1 g/kg shall remain on a 150 µm test sieve.

.4 PHYSICAL PROPERTIES

.4.1 Stability on dilution (MT 41, CIPAC 1, p. 933)

The product, after dilution with CIPAC Standard Water C, shall give a clear or opalescent solution, i.e., free from more than a trace of sediment and/or visible solid particles.

.5 STORAGE STABILITY

.5.1 Stability at 0 C (MT 39.2, CIPAC 1, p. 932)

After storage at 0 C (Note 7) for 48 hours there shall be no separation of material from the product.

.5.2 Stability at 54°C*

After storage at 54 +/- 2 C for 14 days the product shall continue to comply with .2. 4, . 3.2, . 4 .1 and . 5.1.

.6 CONTAINERS

They should be lined, where necessary, with a suitable material or the interior surfaces treated to prevent corrosion and/or deterioration of the contents.

They should comply with pertinent national and international transport and safety regulations.

[2] The analytical method for determination of the relevant impurity is available from the Pesticide Management Group of the FAO Plant Protection Service, or can be downloaded here.

NOTE 1 In the case of mixed salt formulation the approximate content of each shall be stated.

NOTE 2 On a dichlorprop content of 200 g/l and a MCPA content of 100 g/l the maximum permitted extractable acid content would be 200 x 1.11 + 100 x 1.34 = 356 g/l.

NOTE 3 If the buyer requires both g/l at 20 C and g/kg then in cases of dispute the analytical results shall be calculated as g/kg.

NOTE 4 Interim limit which will be reviewed when collaborative work is complete on determination of free phenols.

NOTE 5 The content of free phenols is limited to avoid possible taint of neighbouring crops and foodstuffs.

NOTE 6 On a content of 200 g/kg dichlorprop and 100 g/kg MCPA the maximum permitted free phenol content would be 40 g/kg of the product.

NOTE 7 A test temperature of 0 C may not be suitable for products intended for use in cold countries, and alternative test temperatures may be specified.

DICHLORPROP + MCPA MIXED ESTER EMULSIFIABLE CONCENTRATES

FAO Tentative Specification October 1983
(84.3+2.3/EC/ts/-)

.1 DESCRIPTION

The product shall consist of an emulsifiable concentrate based on dichlorprop and MCPA ester(s) (complying with the respective FAO Provisional Specifications October 1983) as the active ingredient(s) together with suitable solvents and necessary formulants. It shall be free from visible suspended matter and sediment.

.2 ACTIVE INGREDIENT

.2.1 Ester(s)

The names of the dichlorprop and MCPA esters present shall be stated (Note 1).

.2.2 Identity tests (CIPAC 1C, p. 2087, p. 2146)

Where the identity of the active ingredient is in doubt the extractable acids shall comply with any two of the following tests:

.2.2.1 GLC

The major components in the sample chromatogram shall have the same relative retention time as those from a standard dichlorprop and MCPA chromatographed under identical conditions.

.2.2.2 TLC

The major components in the sample chromatogram shall have the same Rf values as those from a standard dichlorprop and MCPA.

.2.2.3 HPLC

The major components in the sample chromatogram shall have the same relative retention time as those from a standard dichlorprop and MCPA chromatographed under identical conditions.

.2.3 Extractable acids (CIPAC 1C, p. 2087, p. 2146)

The extractable acid content expressed as dichlorprop shall be not more than (1.11x + 1.35y) where x and y are the dichlorprop and MCPA contents found under .2.4 (Note 2).

.2.4 Dichlorprop and MCPA (CIPAC 1C, p. 2087, p. 2146)

The nominal dichlorprop and MCPA contents (g/l at 20 C or g/kg; Note 3) shall be declared and when determined the content obtained shall not differ from that declared by more than +/- 7.5% of the declared content.

.3 IMPURITIES[3]

.3.1 Free phenols

Maximum: (1.5x + l.0y)% (Note 4) expressed as 2,4-dichloro-phenol (Note 5), where x and y are the dichlorprop and MCPA contents found under .2.4 (Note 6).

.3.2 Material insoluble in oil

The product shall give a reasonably clear, homogeneous solution which shall leave not more than 1 g/l of residue on a 150 µm test sieve and the sieved solution shall contain not more than a trace of sediment.

.3.3 Water (MT 30.1, CIPAC 1, p. 897)

Maximum: 5 g/kg

.4 PHYSICAL PROPERTIES

.4.1 Emulsion stability and re-emulsification (MT 36.1.1, CIPAC 1, p. 910)

After the stability test (.5.2), the product, when diluted at 30 C (Note 7) with the specified CIPAC Standard Waters, shall comply with the following:

Time after dilution	Limits
0 h	Initial emulsification : complete
0.5 h	'Cream' : maximum : 2 ml
2 h	'Cream' : maximum : 4 ml
	'Free oil' : nil
24 h	'Cream' : maximum : 4 ml
24.5 h	'Free oil' : maximum : 0.5 ml

The product shall be tested in Standard Water A and in Standard Water C.

Alternatively if the buyer requires other CIPAC Standard Waters to be used then this should be specified when ordering.

.4.2 Flash point (MT 12, CIPAC 1, p. 846)

[3] The analytical method for determination of the relevant impurity is available from the Pesticide Management Group of the FAO Plant Protection Service, or can be downloaded here.

If required the flash point of the product shall be not lower than the minimum declared flash point. The method used shall be stated. (Note 8).

.4.3 Volatility (MT 13, CIPAC 1, p. 858)

It shall be stated whether the "volatility" of the product is high or low.

.5 STORAGE STABILITY

.5.1 Stability at 0 C (MT 39.1, CIPAC 1, p. 930)

After storage at 0 C for 48 hours the volume of solid and/or liquid which separates shall be not more than 3 ml/l (Note 9).

.5.2 Stability at 54 C (MT 46.1.3, CIPAC 1, p. 952)

After storage at 54 +/- 2 C for 14 days the product shall continue to comply with .2.4, .3.1, .4.1, .4.3 and .5.1.

.6 CONTAINERS

They should be lined, where necessary, with a suitable material or the interior surfaces treated to prevent corrosion and/or deterioration of the contents.

They should comply with pertinent national and international transport and safety regulations.

NOTE 1 e.g., Butyl ester, iso-octyl ester, etc. For products based on mixed esters the approximate percentage of each shall be stated.

NOTE 2 On a dichlorprop content of 200 g/l and a MCPA content of 100 g/l the maximum permitted extractable acids would be 200 x 1.09 + 100 x 1.35 = 353 g/l.

NOTE 3 If the buyer requires both g/l at 20 C and g/kg then in case of dispute the analytical results shall be calculated as g/kg.

NOTE 4 Interim limit which will be reviewed when collaborative work is complete on determination of free phenols.

NOTE 5 The content of free phenol is limited to avoid taint of neighbouring crops and foodstuffs.

NOTE 6 On a content of 200 g/kg of dichlorprop and 100 g/kg of MCPA the maximum permitted free phenol content would be $(100 \times \frac{1.5}{100} + 100 + \frac{1.0}{100} = 4$ g/kg.

NOTE 7 The temperature at which the test is carried out shall be 30 C, unless otherwise specified.

NOTE 8 Attention is drawn to the appropriate national and international regulations concerning handling and transport of flammable materials.

NOTE 9 A test temperature of 0 C may not be suitable for products intended for use in cold countries and an alternative test temperature may be specified.