Guidelines on Good Labelling Practice for Pesticides

Food and Agriculture Organization of the United Nations

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SECTION 1: INTRODUCTION

1.1 About these guidelines

FAO published "Guidelines on Good Labelling Practice for Pesticides" in 1985 (1). Those guidelines gave guidance on the preparation of a label and specific advice on content and layout. Since that time there have been considerable changes in regulations and requirements. There is, therefore, the need to revise and update the Guidelines.

These guidelines are intended for use by those in industry involved with label preparation and also by national regulatory personnel involved with the approval of labels and the specification or recommendation of suitable text and layout.

The document contains four main sections with appendices. The first section identifies the main objectives and considerations in preparing a label. The second section identifies the information which must appear on a label. The third section deals with writing a label with maximum clarity and consideration of the level of knowledge of users. The fourth section discusses the establishment of toxicity and hazard classifications for a product. The appendices contain examples of labels, hazard statements, agricultural practice statements and other summaries of specific and generic label contents which can help to clarify the general text.

1.2 What is a label ?

A label is the written, printed or graphic material firmly attached to a product container. It is the outcome of years of research on the part of industry and evaluation effort on the part of government regulatory agencies. The label is a mandatory part of the product package. Additional information may be provided by means of technical leaflets or brochures which accompany a container, in which cases these leaflets or brochures should be referred to on the label.

1.3 The importance of clear and accurate labels

Labels are the principal, and sometimes the only, contact between the manufacturer/supplier and the user of the product. Labels are legal documents and convey essential safety information and use recommendations.

The appeal to the user to "read the label" can only be successful if the essential messages on the label are kept as simple and direct as possible. If a label is too complex, too technical, or badly laid out, the product may not be used correctly and the user may be exposed to unnecessary health risks. There is, therefore, a great need for clear directions which can be easily understood by all potential users.

The basic regulations affecting label content are national regulatory requirements. In addition to these, there are additional standards within individual companies and international standards, the most important of which is the FAO International Code of Conduct on the Distribution and Use of Pesticides (2). Labels should conform to all of these regulations and standards.

1.4 General considerations

Most pesticides are manufactured to be sold in several different countries. As a result, accurate translation of product labels into many languages is necessary. In some cases, there may even be a need to have two or more languages on the same label. However, despite the number of language translations on a label, there still remain some users who are unable to read a label. For these users, pictograms which depict safe use and use of protective clothing during application are essential. Even when pictograms are used, however, care must be taken that they are properly understood by the user.

The increased demand for more information on how to use pesticides correctly, and the need for dual languages, hazard symbols and pictograms on labels creates serious competition for space in label design. The four principal ideals to adhere to in preparing a label are clarity, completeness, conformity and consistency.

Clarity is achieved by avoiding complex or excessively technical explanations and by using a clear layout with a prominent display of key words, phrases and symbols, and pictograms. Thus it is important to:

- attract the user's attention;
- tell the user what he needs to know in brief and precise terms;
- use familiar expressions and symbols; and,
- avoid ambiguous statements.

Completeness is ensured by using a checklist of all essential information, so that no important information or advice is omitted.

Conformity is achieved by following existing regulations and guidelines, both national and regional/multinational.

Consistency is assured by the standardization of label components, such as safety texts, so that label texts and layout of different labels will be as similar as regulatory requirements and user needs allow.

There may sometimes be a conflict in the wording required by regulatory authorities on the one hand and the clear instruction to the farmer on the other. Regulatory authorities, however, are frequently open to accepting easier to read statements, especially if they are consulted during the preparation of a label.

Leaflets and brochures are not subject to the same regulatory rules as labels. Nevertheless, the same principles of writing technical data in a simple and easily understood manner apply to leaflets and brochures used for advertising, just as they do for labels. In addition, whether it is a label or leaflets and brochures which provide technical information, it is essential that the information provided is accurate and can be substantiated with technical data.

The writer of the label also has responsibility

1. To the user - who must be able to read and understand the label;
2. To the public and the environment - to protect both public health and the environment; and,
3. To the law - to follow pertinent regulations.

Lastly, labels should have physical durability. They should be resistant to the normal wear and tear encountered in transport, storage and use. These requirements apply equally to the print on the label and the material on which the information is printed. Several years of storage may elapse between manufacture and final use of the product. Without a complete and legible label during storage and at the time of final use, a pesticide is likely to present a serious potential hazard.

SECTION 2: LABEL CONTENT

The purpose of the label is to provide the user with all the essential information about the product and how to use it safely and effectively.

The content of a label is subject to national regulations. At times, there may be additional multinational or regional considerations. With these regulations in mind, the minimum information on the label should tell the user:

* What is in the container
* The Hazard it represents and associated safety information
* Instructions for use

2.1 What is in the container?

The following information identifying the contents of the container should appear on all labels.

(a) Product or Trade name, associated with the product category (e.g. herbicide, insecticide, fungicide, etc.).

(b) Type of formulation -name and code, see International Formulation Coding System (Appendix 6).

(c) Active ingredient, name (ISO) (3) or other locally used common name or in the absence of either the chemical name as used by ISO of IUPAC (4)) and content. This should normally be expressed as "contains x g ai per kg" (for solids, viscous liquids, aerosols or volatile liquids) or "contains x g ai per liter" (for other liquids), or just "y%".

(d) Net contents of the pack. This should be expressed in Metric Units (e.g. liter, gram, kilogram, which can be abbreviated to l, g and kg) unless the country does not use, or only partly uses, metric units. In such situations, local units should take precedence, but metric units should also be given.

2.2 Safety information

There should be a clear warning on the label in relation to:

* Reading the safety instructions before opening the pack.
* Handling, transport and storage warning symbols (See Section 4.3)

* Hazard classification/symbol. There may be a necessity to classify the product with relation to its toxicity (See Section 4.2).

The following should appear on all labels - preferably in black print on a white background.

(a) Safety Precautions

The safety text must cover the following:

- product specific advice
- good agricultural practice
- relevant protective clothing
- precautions when handling the concentrate (if applicable)
- precautions during and after application
- environmental safety during and after application
- safe storage
- safe disposal of product and used container
- how to clean equipment (if a potential risk exists)

(b) Safety Pictograms

Safety pictograms reinforcing the safety text should be included. (See Section 3.4.1)

(c) Warning

The following must appear on all labels:

Keep locked up and out of reach of children

Other warning phrases may be aimed at good agricultural practice and/or steps which need to be taken to avoid adverse environmental effects.

(d) First Aid Advice and Medical Treatment

Most labels should carry first aid and medical advice, where relevant.

Additional information regarding symptoms, special tests and antidotal measures may be added, where appropriate, for particular products.

(e) Leaflets

Any safety text on the label must also appear on any leaflets associated with it.

2.3 Instructions for use

There should be an initial, brief statement of use, e.g.:

Controls aphids in top fruit, or

Kills broad-leaved weeds in cereals

The directions for use on the label must clearly indicate how, when and where the product can be legally used with maximum efficiency and safety according to Good Agricultural Practice. This information may be repeated and/or expanded in a separate leaflet or technical literature, but the essential instructions must always be displayed on the label. The label must emphasize the need to read an attached (enclosed) leaflet before use, if one has been included.

Practical advice must be included on:

(a) How to mix and apply the product, and rate of use.

(b) When to use the product, including timing and frequency (including maximum number of applications per use season), or when not to use it, e.g. during the flowering period of the crop.

(c) Where to use the product - which crops, targets, areas.

(d) Any limitations, such as susceptible crops or varieties, weather conditions, harvest interval.

(e) Compatibility with other products, where appropriate.

(f) How to avoid harming beneficial insects, such as bees and natural predators, or wildlife.

Omit all non-essential information, such as sales messages, mode of action illustrations, etc.

2.4 Other information

In addition to the contents, safety information and instructions for use discussed above, the following information should also appear on all labels:

(a) Local distributor name, address/telephone number. The company responsible for registration of the product in the country concerned.
(b) Registration number, if any.
(c) Manufacturer's name and company logo.
(d) Trade mark acknowledgment - this may have legal implications.
(e) Date of manufacture/formulation/batch number.
(f) Shelf-life, for products with a shelf-life of less than 2 years from the date of release (7).

SECTION 3: HOW TO WRITE A LABEL

This section considers the practical aspects of good, clear label design and layout, how to check individual labels and the use of pictograms. Examples of different labels are shown in Appendix A.1 to clearly establish the application of the principles of good labelling. It is recommended that these example labels are studied in detail before attempting to write a first label.

The label usually includes a number of commonly accepted or mandatory phrases, which are used to cover certain recommendations. Label information is the outcome of a great deal of research and this must be taken into account in arriving at the most appropriate wording. Further details, relating to the wording of various sections of a label, viz., on safety, instructions for use and general information, are provided in the appendices. These may be consulted to provide further guidance on composing a clear, accurate and easily understood label.

3.1 Layout of information

3.1.1 General points

- Layout should be considered before a proof is prepared. Labels may be as one, two, three or more panels. If label size allows, the three panel layout is preferred. Examples of how to structure the different labels are given in the following pages. Actual examples of labels are shown in Appendix A.1.

- A panel label should only be used where the uses of the product are limited and Directions for Use, General Instructions, Safety Instructions, Safety Precautions and First Aid require little detail. It is usually suitable for products in Class III (Slightly Hazardous), of the WHO recommended classification of pesticides by hazard (6). (See Section 4). It should not be the sole source of information when the pack size is small. In such circumstances, ancillary panels can be printed on a separate extension or attached leaflet. (See Section 3.1.3)

- Break up the information into small, separate paragraphs. Each block of subject matter should have a clearly understood heading.

- The information should be structured in the sequence the user requires. As an example, for instructions on how to use the product, a possible logical sequence could be:

    1. Crop, variety
    2. Target organisms (pest, disease, weeds)
    3. Warning statement (e.g., conditions when not to use)
    4. Safety measures in handling, applying and disposal
    5. Application conditions (e.g., crop stage, weather, soil, etc.)
    6. Method of application
    7. Dose rate
    8. Mixing instructions
    9. Advice for after spraying (re-entry period, pre-harvest interval).

- Avoid expressions which could mislead or cannot be substantiated.

Do not use words such as "SAFE", "HARMLESS", "NON-TOXIC" in respect of risks to humans or animals (even when used with a qualifying phrase, such as "when used as directed"), or superlatives, such as "best", "most effective", superior control", etc. (See Section 4.4)

- Avoid using overstickers to amend label information except where necessary and agreed to by the regulatory authority and the registrant. Where stickers are used they must not cover other valid aspects of the label.

3.1.2 Label layout

One Panel Layout
Product name
Active ingredient name and content
Formulation type
Registration number (and reference to pertinent legislation if required nationally)
Formulation date and batch number
Summary of uses
Directions for use
Withholding period (reentry period, preharvest interval)
Safety precautions
Warning phrases
Statements for Good Agricultural Practice
First Aid instructions and advice to doctors (if required)
Legal responsibilities
Net contents
Name and address of manufacturer, distributor and/or registrant (as appropriate)
Product/User Category
Two Panel Layout

In this case, the main panel would contain the information needed to identify the product, and provide the key information on summary of uses, safety precautions and hazard symbol.

The second (ancillary) panel would contain the rest of the essential information, such as directions for use, warning phrases, etc.

Three Panel Layout

If label size allows, the three panel layout shown below is suggested. The main panel would need to identify the product with other essential information, whilst the two other panels can be separately devoted to safety and instructions for use.

Ancillary panel (Safety)	Main panel (information)	Ancillary panel (instructions)
	*product name	
	*active ingredient (name and content)	
*summary of uses	*formulation type	
*safety precautions	*registration number	*directions for use
*warning phrases	*formulation date	*re-entry period
*good agricultural practice	*batch number	*pre-harvest interval
*first aid	*net contents	*legal responsibility statement
*medical advice	*manufacturer	
	*distributor, agent, registrant	
	*product/user category	
	*hazard symbols	
	*directions to read the label	
	*pictograms	

NB: Remember that the relevant local/national regulations must be observed.

3.1.3 Labels for small packs/supplementary leaflets

The increasing use of small packs to suit small holder users can present problems with labelling due to the limited space available for text. Some hints at reducing text is given in Section 3.1.4. However, if local or national regulations permit, information can be printed on a separate extension or attached leaflet.

When using a supplementary leaflet, always ensure:

- The safety panel is on the part of the label that is glued to the pack.
- On the label include the instruction "Read the leaflet before using the product".
  - The use of a separate or attached leaflet is permitted by the relevant local/national regulation. Leaflet must be firmly attached to product container so that it stays with the product through sale and use.
- Key information on the label is repeated in the packaging leaflet.

An example for separation of information on label and packaging leaflets is given below.

<table>
<tr><th>LABEL</th><th colspan="2">PACKAGING LEAFLET</th></tr>
<tr><td>*Product name
*Active ingredient (name and content)
*Formulation type
*Summary of uses
*Registration number
*Formulation data
*Batch number
*Net contents
*Manufacturer
*Distributor/agent/registrant
*Warning phrases
*Safety precautions
*First aid, advice for doctors
*Hazard symbols, pictograms</td><td>*Product name
*Directions for use
*Re-Entry period
*Pre-harvest interval
*Legal responsibility
*Manufacturer</td><td>Safety precautions
Warning phrases
*Good Agricultural Practices
*First aid
*Advice to doctors</td></tr>
<tr><td>"Before using product, read leaflet".</td><td colspan="2">"Before using product, read the label"</td></tr>
</table>

3.1.4 Label for pre-measured packs and twin/multi-packs

When a product is packed in two or more pre-measured quantities in an outer container (pre-measured packs), or when two or more products are packaged individually and sold as one unit packed together (twin/multi packs), additional labelling is required.

The outer container must be fully labeled in accordance with these guidelines. For pre-measured packs, the main panel must include the statement, "CONTAINS...MEASURED PACKS WHICH IT IS ILLEGAL TO SELL SEPARATELY."

For both pre-measured packs and twin/multi packs, the inner packs must be labeled with the essential information: hazard symbols, product name, active ingredient statement, formulation statement, summary of uses, legal responsibilities, manufacturer, distributor, formulation date, batch number, etc., net weight. (See Appendix A.1)

3.1.5 Dual/Multi-language labels

Where the label is required to be printed in more than one language, each language should ideally have its own complete label. Translations must convey the same meanings in each language. Only in extremely rare circumstances will there be sufficient space on a single label for two or more complete sets of information in separate languages. This shortage of space can be overcome by having the primary language on the container label and other languages on an attached leaflet. If possible, key safety information in all required languages should be on the label firmly attached to the container.

3.2 Style and wording of text

3.2.1 Print size and style

It is recommended that all safety text should be at least 8-point, and that all other text should be at least 6-point. The preferred size is 11-point. Examples of print size and style are given in Appendix A.2.

Highlighting with bold letters is more effective than using capitals.

The type face selected should be very clear and without decorations or oddities. The print style preferred is Helvetica (European Grotesque) or Modern. Avoid italics, except for Latin names, and even these should be avoided when there is a well-defined common name.
Use clear letter separation, not close tracking.
Leave adequate space between lines of text.
Avoid vertical or diagonal text.
Overprinting illustrations, logos or "ghost" pictures make text less easy to read.

Wherever possible, the label should be set out in clearly headed distinct blocks making deliberate, but not excessive, use of colour for greater impact. Clear space around blocks of statements and symbols also attracts attention.

3.2.2 Effective use of space

Since space is usually at a premium on most labels, one way of gaining space, and thus enabling a larger print size to be used, is to reduce text by avoiding unnecessary information, keeping sentences short and precise, and generally making the text as economical as possible, whilst retaining all essential information.

Another way of gaining space on labels and attaining the correct print size is to reduce white space (that part of the label which is not printed on). White space is to be found at the ends of lines, between letters, words, lines and paragraphs, between columns and in borders around the text. Space around blocks of statements and symbols is clearly necessary in many cases, since it is a means of attracting attention to the statement, as indicated above. Nevertheless, with that reservation in mind, some hints for reducing text and white space and thus allowing larger print size are given here.

- Go through the text carefully and reduce long sentences and long words to shorter ones, providing the meaning is not lost.

- Remove any non-essential information, such as overly technical descriptions of the activity of a product, or simplify these to a few words.

- Tabulate information on rates of use, volumes, etc.

- Reduce the space between paragraphs, but not between lines.

- Reduce the tracking (see Appendix A.2) of less important sentences, e.g. those that are descriptive.

- Use abbreviations where it is certain they will be understood.

- Move information to less-crowded parts of the label.

- Check relative widths of columns so paragraphs end nearer the column edge.

- Increase the number of columns - this sometimes enables better use of space to be made at the end of short sentences, e.g., in the safety text.

- Use a separate or integral leaflet.

For texts which need to be translated into another language, it is important to remember that some languages take up more space than others. (See also Section 3.1.5)

3.2.3 Layout design and artwork

Apart from the decision as to the number of panels needed in the label (Section 3.1.1), careful design of the actual label is crucial to the end user - in drawing his attention to the essential text and making it more easily understood.

The guidance of a professional designer may be needed, although hints as to successful label layouts can be obtained by studying the examples given in Appendix A.1.

Discussing the layout with the printer, in advance of proofing, can often be helpful. Do not leave the printer to lay out the text "as best he can". The printer cannot be expected to ensure all the standards are adhered to, and must be instructed precisely.

3.3 Use of colour

Red is a generally accepted warning colour and should be used only to highlight warning phrases, or for hazard symbols and safety precaution instruction headings.

For best contrast and easy reading, the text on labels should be mainly black on a plain white background.

On leaflets and brochures, colour will generally enhance attractiveness. Showing things in their true colour will increase understanding. Important parts of drawings can be emphasized by contrasting colours. But beware - too many, or too intense, colours can distract from the intended message.

Colour contrast is just as important as the colour itself. Thus, red should always be on a white background and never on other colours, such as yellow.

To maintain contrast, use strong colours on a neutral contrasting background, viz:

- black on white
- black on yellow
- red on white
- green on white
- white on blue

FAO has introduced a colour coding scheme based on the WHO classification of hazard of the formulation. This is described more fully in Section 4.

FAO recommends that a colour code is used to denote toxicity classification. The relevant colour band has to be included on the label according to local regulations. The same colour is usually not permitted elsewhere on the label.

3.4 Use of illustrations/pictograms

There is usually insufficient space on the label itself to include any illustrations, with the exception of mandatory or suggested hazard, safety and precaution symbols (Appendix A.3.1) and pictograms. Illustrations are best confined to supplementary label leaflets, brochures and posters.

3.4.1 Pictograms

A pictogram is a symbol which conveys a message without the use of words. The set of pictograms (5) have been devised by GIFAP in cooperation with FAO, with the aim of communicating key safety information to users in different countries, and with varied levels of literacy.

There are several points to note about the use of safety pictograms:

- In some countries, permission from regulatory authorities may be required but, in general, most are encouraging their use.

- Pictograms should be introduced into the label when it is first drafted.

- Pictograms should echo and reinforce safety text. If a precaution appears for which a pictogram exists, the pictogram must also appear.

- Conversely, a pictogram should never be used unless the safety text carries the corresponding phrase. The overriding principle is that pictograms should relate to the text - never contradict it or make it less clear.

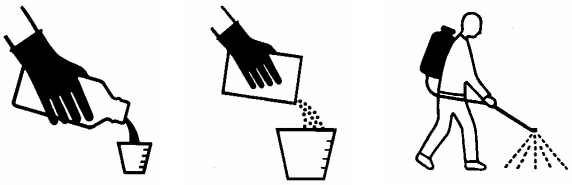
- Only use FAO/GIFAP approved pictograms, unless it is known that the country has successfully developed pictograms reflecting local culture and practices.

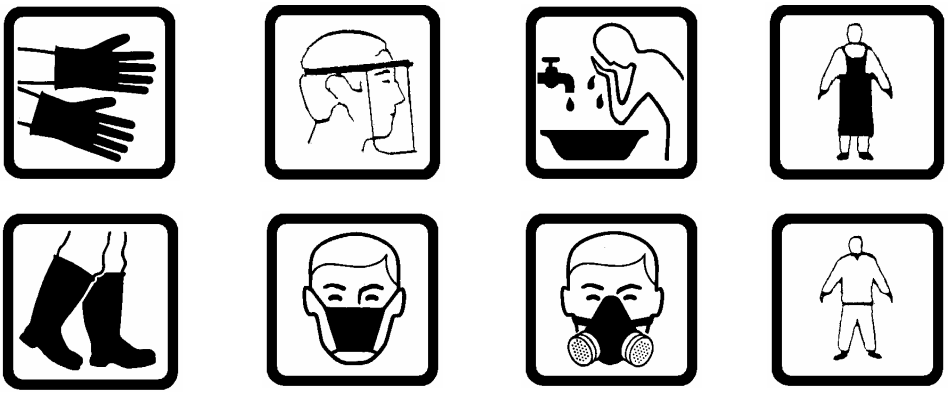
- The two pictograms which should appear on all labels are those depicting washing after use and locking away the product out of reach of children.

The complete set of FAO/GIFAP pictograms is given below:

The preferred size for pictograms is 15 x 15 mm, the minimum 7 x 7 mm.

STORAGE 

ACTIVITY 

ADVICE 

WARNING 

3.4.2 Illustrations

Illustrations are mainly used on leaflets, brochures and posters.

They can be helpful for showing:

- what something looks like
- how to do or not to do something
- a sequence of events
- results of claimed activity

3.5 Special purpose labels

Variations to the general principles of labelling may be necessary to suit special purposes. A few instances are discussed below.

3.5.1 Bulk material labelling

Material which is transported in bulk, either for reformulating, repacking or disposal, should have an appropriate label attached.

The advice appearing on such a label will differ from that which appears on labels intended for farm workers and applicators. Field use recommendations should not be

included and safety in handling and storage of bulk material will differ significantly from that given on labels destined for use by those in the field.

It is important to ensure that the national and international transport requirements are met. In addition, the following essential information should appear on all bulk material labels as a minimum:

- Common chemical name with percent active ingredient
- Net contents
- Country of origin
- Emergency response telephone number
- Handling advice/precautions
- Storage recommendations
- Advice in case of spillage
- First aid advice
- Medical treatment

Some of this information, but not all, will also appear on the transport emergency card (TREM card) and both sets of data should be mutually consistent.

3.5.2 Chemically treated seeds

Labelling of chemically treated seed requires a different approach, since the standard seed bag or sack is not a pesticide container and only carries information of the nature, weight and perhaps origin of the contents.

Warning phrases should be applied to the outside of the container, which cannot be removed and are in the language of the area where the seed is to be used. Standard warning phrases are as follows:

- This seed has been chemically treated - minimize handling to retain effectiveness of seed dressing.
- Do not re-use sacks for food or animal feed.
- Do not use treated seed for food or animal feed.

3.5.3 Application by air

If a product may be applied by air, information should be set out clearly in the general instruction section of the label. Any special authorization or legislative requirements should also be included. Several countries have specific regulations or codes of practice. Restrictions may be placed on chemicals that may be applied by air, or locations where aerial application may be undertaken.

Standard safety precaution phrases for ground application should be used for the protection of the ground team, and instructions for pilot safety should be included, when available.

3.5.4 Application in confined spaces

The use of pesticides in confined areas, such as glasshouses or in dwellings for public health and hygiene, may require additional safety precautions to protect workers, animals or livestock, and avoid contamination of foodstuffs etc. There may be specified time limits for reentry to treated premises or the harvest of crops after spraying.

3.6 How to check a label

A suggested flow chart and check list for ensuring all the information is contained in the label are given in Appendix A.7. All the information on the check list should be confirmed before and after printing.

Structure of Information

- Is layout according to standard?
- Are all statements necessary?
- Are headings clear?
- Is information in logical sequence?

Wording of Text

- Will all likely users understand the language/message?
- Are abbreviations necessary and correct?
- Are sentences short, concise? (no more than 6-10 words).
- Are all instructions clear and unambiguous?

Print Style

- Is the text predominantly black on a white background?
- Does the print size and style conform to the standards? (see Appendix A.2).
- Can you read all text at arm's length in normal daylight?
- If all the text is not clearly visible (all safety text must be), has the user been instructed how to find the rest of the text - in the correct language?

The printed label should finally be checked to ensure:

- The colour contrast is satisfactory.
- All the print is clearly legible at arm's length.
- The safety text is on a part of the label which is to be firmly fixed to the pack.
- The illustrations are relevant to the message and understandable to the user.
- Instructions for finding supplementary information are clear.
- The printed label is accurate, i.e., reads the same as the approved draft.
- Fold-out labels can be easily read.
- Perforations and other aids are effective.

Quality of Material

Where paper is used for labels and packaging leaflets they must be:

- Strong enough to avoid tearing during transport and handling.
- Durable to withstand storage.
- Coated to resist wetting and smudging of text.
- Able to accept print without smearing.

Ink and adhesive must also be durable and not affected by extremes of climate or the contact with the product.

SECTION 4: HAZARD CLASSIFICATION

4.1 Definitions

It is most important that the label warns the user of the toxicity and hazards associated with the product, and the precautions which need to be taken when handling and using it.

Toxicity is a measure of the capacity of a substance to cause injury or death, and is related to dose. It is an intrinsic property of the substance. The dose-response relationship is a way of quantifying acute toxicity, and the LD_{50} is a crude estimate of the dose needed to kill 50% of the test animals when they are exposed to the chemical by the oral, dermal or inhalation route. The value is usually expressed in milligrams of chemical per kilogram bodyweight of test animal. The smaller the LD_{50} value, the greater is the acute toxicity of the chemical.

Hazard represents the potential for injury to occur. It is a function of the toxicity of the chemical and degree of exposure. Even a highly toxic chemical presents little hazard to man when the means of exposure are largely eliminated.

Risk is the probability of a hazard occurring under specified conditions. Safety, the reciprocal of risk, is the probability that harm will not occur under specified conditions.

When satisfied that an adequate assessment has been made of all the potentially hazardous components of the product, the next step is to assess the risks that may arise from the proposed use. These include risk to the applicator, the consumer of treated crops, beneficial species or wildlife, and to the environment. The risks are minimized if the user follows the appropriate warning and precautionary statements on the label. It is the responsibility of the manufacturer/supplier and regulator to ensure that the safety statements are adequate to minimize the risks, and that the benefits of using the product outweigh any risks involved.

4.2 Hazard classification

Potential hazard is assessed on the formulation or product in the pack and therefore takes into account the properties of the solvents, diluents or other adjuvants, in addition to the active ingredient. The WHO Recommended Classification of Pesticides by Hazard (6) is widely used and is based on the oral and dermal LD_{50} values (to the rat). The more restrictive class is always chosen from the oral and dermal LD_{50} classifications. From these values, one of four coloured bands is assigned with a corresponding hazard statement and one of two hazard symbols, which denotes classification of hazard in use, is placed along the bottom of the label.

TABLE 1: Determination of WHO hazard classification based on acute LD_{50}(rat) of formulated product (mg/kg)[6].

WHO Hazard Class	Information to appear on label				Acute LD_{50} (rat) of formulation (mg/kg)			
					ORAL		DERMAL	
	Hazard statement	Band colour	Hazard symbol	Symbols and words	Solid	Liquid	Solid	Liquid
Ia Extremely hazardous	VERY TOXIC	PMS RED 199 C		 **VERY TOXIC**	5 or less	20 or less	10 or less	40 or less
Ib Highly hazardous	TOXIC	PMS RED 199 C		**TOXIC**	5 - 50	20 - 200	10 - 100	40 - 400
II Moderately hazardous	HARMFUL	PMS Yellow C		 **HARMFUL**	50 - 500	200 - 2000	100- 1000	400 - 4000
III Slightly hazardous	CAUTION	PMS Blue 293 C		**CAUTION**	> 500	> 2000	> 1000	> 4000
Products unlikely too present a hazard in normal use		PMS Green 347 C			> 2000	> 3000		

* PMS is a colour matching system, mainly used by printers, devised and patented by Pantone, Inc. USA. 🗁 See Table 5 of the WHO Recommended Classification of Pesticides by Hazard: Bibliography reference 6.

4.2.1 Calculation of LD_{50} values for formulations where data are not available (6)

It is always preferable to have experimental data on the formulation. However, where experimental LD_{50} data are not available, estimated values may have to be used. These can be estimated from the LD_{50} values of the unformulated technical grade active ingredient published by WHO and FAO by means of the following formula:

- Formula for estimating LD_{50} values for a product containing one active ingredient:

The estimated LD_{50} is calculated from the formula: $\frac{Tx100}{C}$

where T = the acute oral LD_{50} of the active ingredient in mg/kg;
C = the % concentration of the active ingredient in the formulated product.

These estimated values hold reasonably true for solid preparations but usually give a low estimate of the toxicity of liquids.

- Formula for estimating LD_{50} values for a product containing two or more active ingredients

It is not possible to include classification of mixtures of pesticides in the guidelines; many of these are marketed with varying concentrations of active constituents. There are three possible approaches to the classification of mixtures, in order of preference:

(a) require the formulator to obtain reliable acute oral and dermal toxicity data for rats on the actual mixture as marketed; or

(b) classify the formulation according to the most hazardous constituent of the mixture as if that constituent was present in the same concentration as the total concentration of all active constituents; or

$$\frac{C_A}{T_A} + \frac{C_B}{T_B} + \frac{C_Z}{T_Z} = \frac{100}{T_M}$$

(c) apply the formula

where C = the % concentrations of constituents A, B Z in the mixture;
where T = the oral LD_{50} values of constituents A, B Z;
where T_m = the oral LD_{50} value of the mixture.

The formula can also be used for dermal toxicities provided that this information is available on the same species for all constituents. The use of this formula does not take into account any potentiation or protective phenomena.

4.2.2 Inhalation toxicity

Inhalation hazard from commercially formulated products is unlikely to cause problems under normal open air conditions, and is not usually taken into account. Special precautions may need to be included, however, for a product used in confined areas such as fumigants, or if the product contains a volatile and/or toxic solvent.

The product (formulation) may present other potential hazards. It could be irritating to the skin or eyes, explosive, corrosive, flammable, highly flammable or oxidizing. Definitions for these terms and appropriate hazard symbols are set out in Appendix A.3.

As distinct from safety pictograms, a hazard symbol denotes a hazard in use in transport or in storage. The product classification system described should not be confused with international transport and storage hazard classification symbols, e.g. the classification and labelling of dangerous substances in the European Communities (8). Some hazard symbols are also related to national, regional or international schemes and should be used with care.

Hazard symbols should never be simply copied from one label to another if the product is destined for a different country. Advice should always be sought.

4.3 Product/user categories

The primary considerations in categorizing pesticide products are who the user will be and/or the use for which the product is intended. Three categories for formulated products are recommended, based primarily on the WHO Recommended Classification of Pesticides by Hazard.

Domestic

Where the product is marketed to consumers for use in and around a dwelling. The intent of the DOMESTIC category is to provide consumers with relatively safe products for such uses as insect and rodent control within the home, weed control in gardens etc. DOMESTIC CLASS products should meet the following criteria:

(1) Products that fit into "Class III" (Slightly Hazardous) or "Products unlikely to present a hazard in normal use" of the WHO Recommended Classification of Pesticides by Hazard".
(2) No special precautions or equipment required for inhalation hazard.
(3) Products and Containers can be safely discarded by placing in household garbage.
(4) Package sizes limited to amounts that can be safely stored by consumers and used in a single season.

Commercial

Where the product is to be marketed for general use in the commercial activities specified on the label. More descriptive words such as AGRICULTURAL or INDUSTRIAL may also be used. The intent of the COMMERCIAL category is to provide operators engaged in farming or commercial pest control operations with products that can be used safely and efficaciously in their particular business. COMMERCIAL products should meet the following criteria:

(1) Products that fit into Class II (Moderately Hazardous), Class III (Slightly Hazardous) or "Products unlikely to present a hazard in normal use" of the WHO Recommended Classification of Pesticides by Hazard.

Restricted

Where additional limitations respecting the display, distribution, use or operator qualifications must be specified on the label because of safety concerns for humans, plants, animals or the environment. The intent of the RESTRICTED category is to limit the availability of relatively hazardous products to situations where they can be used safely. These products may be considered more hazardous because of inherent toxicity or because of intended use in environmentally sensitive areas. Such areas could include forest and aquatic sites of application. RESTRICTED products meet the following criteria:

(1) Products that meet the criteria of Class Ia (Extremely Hazardous) or Class Ib (Highly Hazardous) of the WHO Recommended Classification of Pesticides by Hazard.
(2) Potentially significant environmental risks.

In some circumstances 2 categories of products may be sufficient i.e. a restricted category and a general category for all other products.

Product/User categories can be used primarily to distinguish the appropriate channels of distribution and sale and to direct product to users with varying degrees of training. For example sale of Restricted products could be limited to certain outlets with special storage conditions and to distributors and users who have received special training in their handling and use.

4.4 Determining hazard symbols and statements

Once the information on a product is complete, a decision can be made on the appropriate hazard symbols, warning phrases and safety precautions, withholding periods and first aid instructions to be used. At this stage, a check should be made of existing labels for similar products to ensure that assignments and statements are consistent.

Appendices A.3 and A.4 provide:

- Standard hazard symbols
- Standard phrases amplifying the hazard symbols.
- First aid instructions and advice to doctors.
- Withholding period statements
- Warning phrases and standard phrases for Good Agricultural Practice.

A label for an extremely hazardous Class Ia product, used on food crops, will require information from all the categories listed above, whereas a product in Class III, not used on food crops, will require only a minimal number of the statements set out in Appendices A.3 and A.4.

4.5 Use of positive statements on labels

Occasionally, positive statements on labels, that a product is safe with respect to certain organisms in certain situations or circumstances, can be helpful. Specific claims on the safety of a product to bees, beneficial insects, fish, etc., when used correctly, are permitted, provided scientific evidence is available to support the claim.

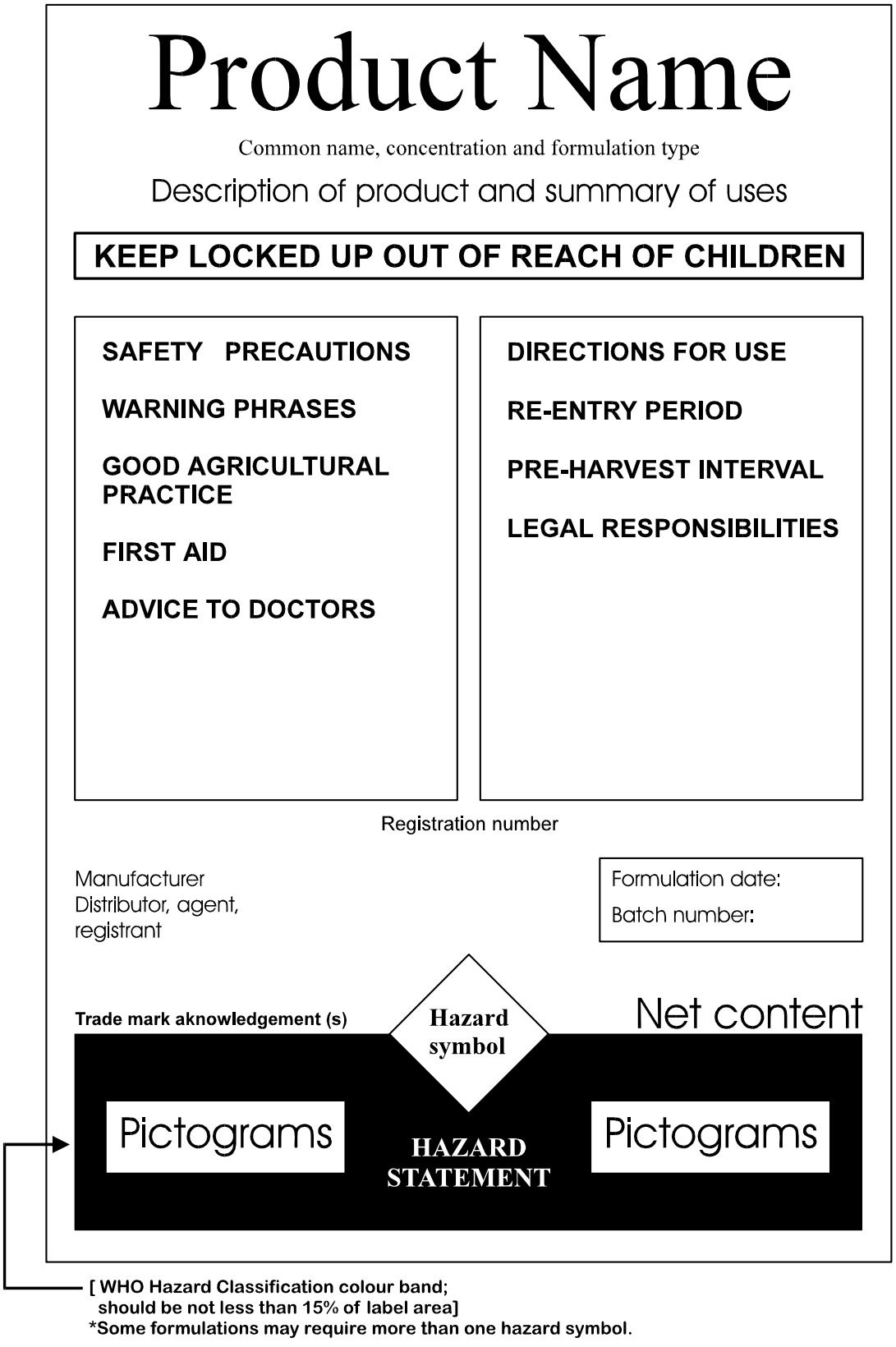
The main criterion for inclusion of such phrases on a label or supporting leaflet is that they can be substantiated by scientific evidence. It is important that research results or quotations from scientific literature are not misused, or that scientific terms and irrelevancies are not used to make claims appear to have a scientific basis that they do not possess (see Article 11.1.7, FAO Code of Conduct, (2)).

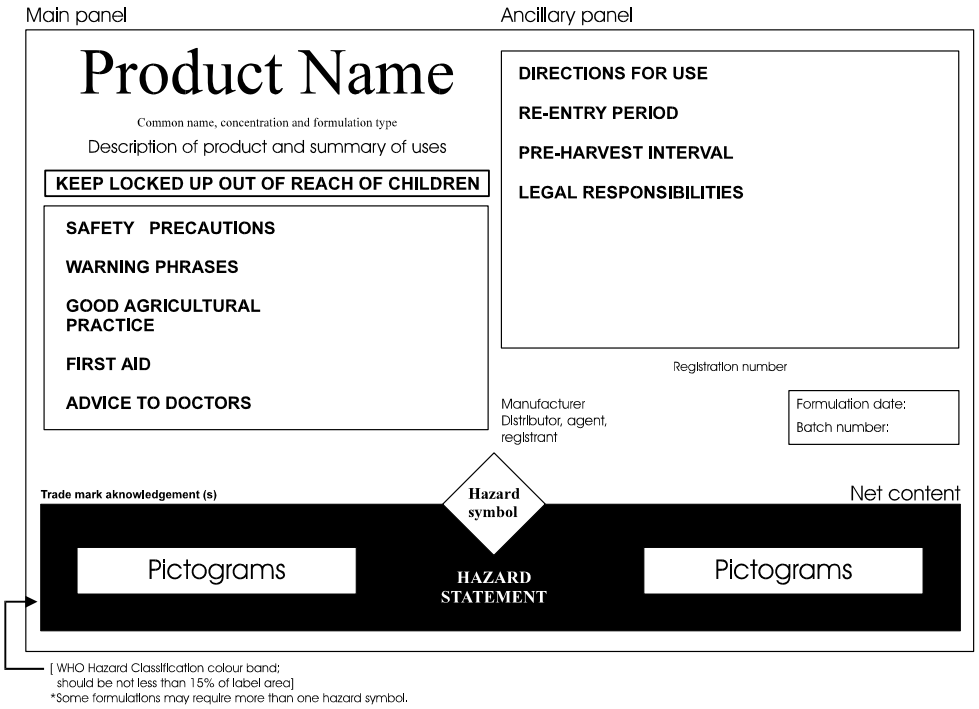
It is also necessary to avoid including all general statements such as "safe", "harmless", "non-toxic", etc., even when they are accompanied by a qualifying phrase such as "when used as directed" (Article 11.1.8, FAO Code of Conduct, (2)).

APPENDIX A.1

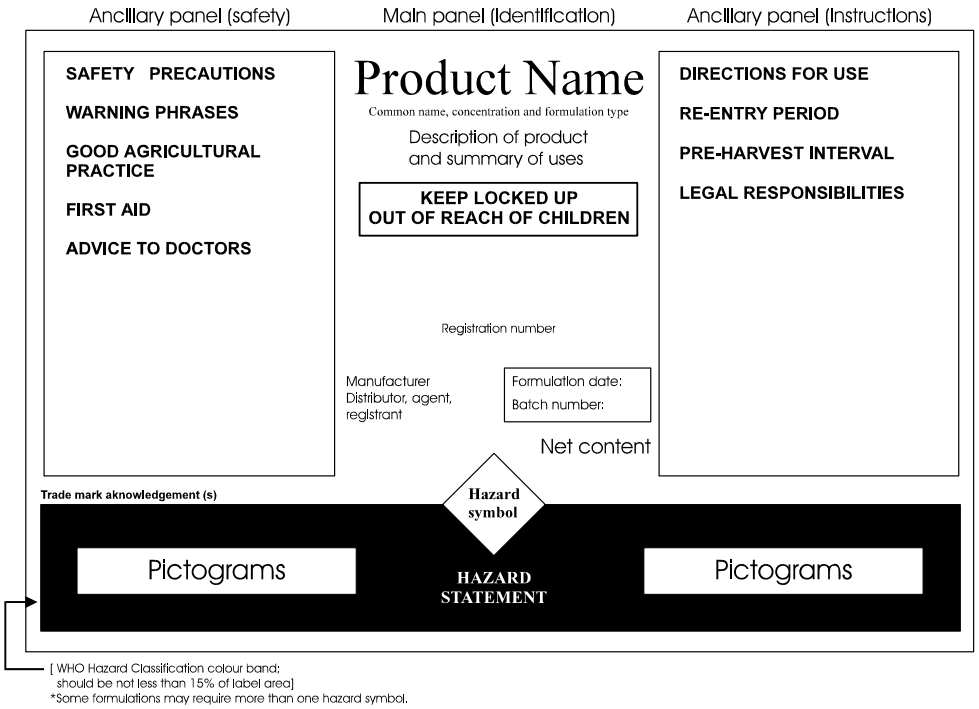
EXAMPLES OF LABELS

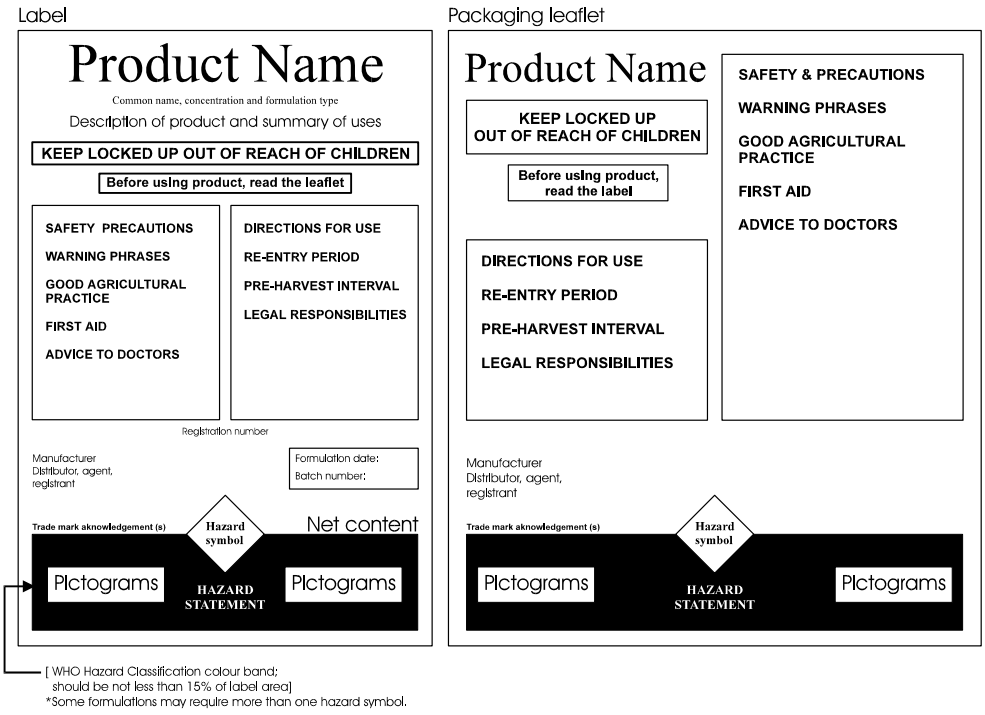
A one panel label





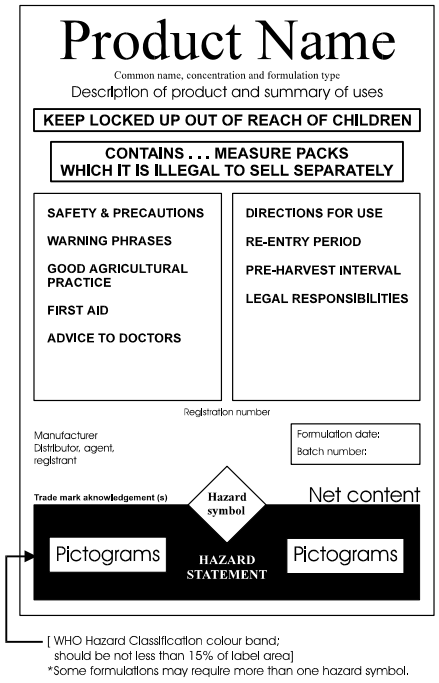
A two panel label


Ancillary panel (safety)
Main panel (Identification)
Ancillary panel (Instructions)
SAFETY PRECAUTIONS
WARNING PHRASES
GOOD AGRICULTURAL PRACTICE
FIRST AID
ADVICE TO DOCTORS
Product Name
Common name, concentration and formulation type
Description of product and summary of uses
KEEP LOCKED UP OUT OF REACH OF CHILDREN
Registration number
Manufacturer Distributor, agent, registrant
Formulation date:
Batch number:
Net content
DIRECTIONS FOR USE
RE-ENTRY PERIOD
PRE-HARVEST INTERVAL
LEGAL RESPONSIBILITIES
Trade mark aknowledgement (s)
Hazard symbol
Pictograms
HAZARD STATEMENT
Pictograms
A three panel label
[WHO Hazard Classification colour band;
should be not less than 15% of label area]
*Some formulations may require more than one hazard symbol.



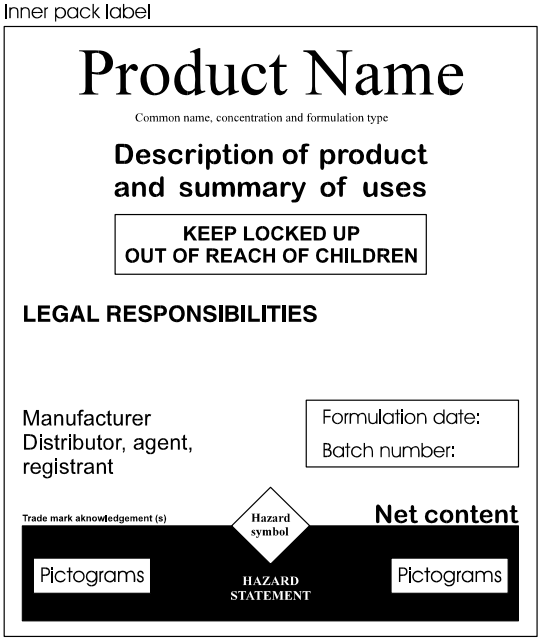
Example for separation of information on label and packaging leaflet

Outer container label



[WHO Hazard Classification colour band;
should be not less than 15% of label area]
*Some formulations may require more than one hazard symbol.

Inner pack label



Appendix A.2 PRINT SIZE AND STYLE GUIDE

The right hand edge of this sheet is marked with print size graduations. Point size is the distance between the top of a capital letter and the bottom of a lower case descender (eg. between Lp). This text is 12 point (pt).

Minimum print sizes
All safety text should be at least 8 point, and all other text should be at least 6 point. The preferred size is 11 point.

For labels which may not be read in perfect conditions, it is sensible to aim for a minimum of 8 point for all text.

Examples of print sizes

This is an example of 6 point print. Under most practical conditions in the field it is likely to be to difficult to read, and thus should be used only where there is absolutely no alternative.

6 point (1.25 mm)

7 point (1.75 mm)

This is an example of 8 point print which, in most cases, should be the minimum on labels.
Bold print can be used at this size but not below

8 point (2 mm)

This is an example of 10 point print which is easy to read for most people in most conditions.

10 point (2.5 mm)

This is an example of 11 point, the size preferred by FAO

11 point (2.7mm)

Print Style

Condensed print should never be used:
Condensed print is difficult to read at any print size

Leading is the space between lines, measured in points.
On labels, the minimum should be 2pt for ease of reading.

How easy is it to read this sentence? (+10)

How easy is it to read this sentence (standard)

Italic print should be used for *Latin names* only

Bold print should be used for emphasis.

Print on a label should all run in the same direction and should never overlap, even in a different colour.

APPENDIX A.3: SAFETY STATEMENTS

Introduction

Proposals for safety precautions, first aid instructions, advice to doctors and warning phrases are initially drawn up by companies or persons submitting labels for approval, and are based on knowledge of the chemical, its formulations, uses, toxicity and potential hazards. The final decision concerning the acceptance of these proposals is, however, the responsibility of the registering authority. These guidelines provide standard statements to be used on product labels.

The statements used must convey understanding of potential hazard in a clear, concise way and in a minimum of words. Other phrases or variations should not be needed, except in special circumstances not adequately covered by this document.

A.3.1 Safety statements

"KEEP LOCKED UP OUT OF REACH OF CHILDREN"
This statement should be included on the main panel of each label.
The statements set out below in CAPITAL letters should appear on the label in CAPITAL letters, followed by the appropriate phrase or phrases in lower case letters.

DO NOT smoke, eat or drink when using this product.

THE PRODUCT IS:

Harmful
Toxic
- if swallowed
- if in contact with the skin
- if inhaled

Irritating to eyes
- skin
- respiratory system

WHEN WORKING WITH OR PREPARING PRODUCT:

AVOID: dust
smoke
vapour
spray mist
gas
contact with mouth, skin and eyes

WEAR: synthetic rubber gloves
apron
overalls
rubber boots
goggles
faceshield
headcover or hood
dust mask
respirator

IF CONTAMINATION OCCURS:

Immediately take off heavily splashed or contaminated clothing.

Wash - affected parts thoroughly with plenty of water.
clothing before re-use.

AFTER USE:

Wash - hands and exposed skin before eating, drinking or smoking.
- overalls, boots, hat and other protective clothing thoroughly, especially inside of gloves.

A.3.2 First aid instructions and advice to doctors

Mandatory for all products

"If skin or eyes are contaminated, wash immediately and thoroughly with plenty of water".

"If skin has been splashed remove contaminated clothing, wash skin well, and avoid exertion. Get medical attention. Show the label if possible".

"Confirmation of diagnosis is by . . . . . (state special test recommended)".

"Specific treatment recommended . . . . . .(state any special antidotal measures)".

Mandatory for all products (con't)

"Other measures of treatment or precaution. . . . . ".

"Further information is available from . . . . . (give address and phone number of distributor, manufacturer or Poison Control Center, as most suitable)".

APPENDIX A.4: AGRICULTURAL PRACTICE

A.4.1 Withholding period statements

"DO NOT apply later than . . . days/weeks before harvest".

"DO NOT treat/apply to stock later than . . . days before slaughter".

"Dangerous/harmful to livestock. Keep livestock out of treated areas for at least . . . hours/days after last treatment".

"Keep unprotected persons out of treated areas for at least . . . days after last treatment".

"Keep animals/children out of treated areas for . . .days/hours after last treatment".

"DO NOT use treated product for human consumption for . . . hours/days after last treatment".

"DO NOT process into food for . . . days after last treatment".

"For use on following crops only, with stated minimum interval between last application and harvesting".

"Ventilate treated areas/buildings for . . . hours before re-occupation".

A.4.2 Statements and phrases for Good Agricultural Practice

Animals And The Environment

"Dangerous/harmful to domestic animals and wildlife".

"Keep stock out of treated areas until all the weeds are dead".

"Dangerous/harmful to fish; do not contaminate lakes, rivers, ponds or streams with waste chemical or used container".

Food And Animal Feedstuffs

"DO NOT apply to food or feed crops".

"DO NOT apply to surfaces coming into contact with food".

"Keep away from food, drink and animal feeding stuffs".

Treated Seed

"This seed has been chemically treated - do not handle unnecessarily".

"DO NOT re-use sacks for food or animal feed".

"DO NOT use treated seed for food or animal feed".

A.4.3 Care, use and disposal of containers and baits

"Keep tightly closed in original labelled container".

"DO NOT re-use this container for any other purpose".

"Keep labelled container in a safe place away from food, children and animals".

"Remove used container and dispose of safely".

"Empty containers must be washed out".

"Mark baits 'POISON' and place out of reach of children and animals".

Disposal of Baits And Spillage

"Remove all baits and burn dead pests after treatment is completed".

"Remove any spillage and bury in a safe place".

A.4.4 Care of equipment, area to be treated and occupants of treated areas

"Keep application equipment in good condition, free from leaks and external contamination".

"DO NOT use where food could be contaminated".

"Remove or cover food before treatment".

"Before treatment remove livestock, birds, fish, domestic pets".

"DO NOT apply directly to livestock, feed or water tanks".

"Before treatment, cover or remove any equipment used with food or drink".

"DO NOT apply to clothing, bedding or fabrics".
"Warn occupants against placing food onto treated surfaces".

"Keep animals/birds/domestic pets/children away from premises or materials being fumigated or ventilated after fumigation."

APPENDIX A.5: PHYSICAL PROPERTIES

Set out below are definitions, pictorial symbols and standard statements which indicate physical properties which may relate to the product label being drafted.

The symbols must be in a diamond, printed in the colours specified, and the dimensions must be not less than one-tenth ($^1/_{10}$th) the area of the main panel of the label, and never be less than 10 mm x 10 mm.

DEFINITIONS:

Corrosive : Substances which may on contact with living tissues destroy them.

Explosive : Substances which may explode under the effects of flames, or are more sensitive to shocks or friction than dinitrobenzene.

Flammable : Substances with a flash point of 21-55^{o}C; and aerosol dispensers containing over 45% by weight or over 250 g flammable components, i.e., gases flammable in air at normal pressure, or liquids of flash point less than 100^{o}C.

Highly Flammable : Substances which either -

(a) May ignite spontaneously in air at ambient temperature;

(b) May ignite readily and continue to burn after brief contact with a source of ignition;

(c) Have a flash point BELOW 21^{o}C;

(d) Are gases flammable in air at normal pressure;

(e) Give off dangerous amounts of flammable gas in contact with water or damp air.

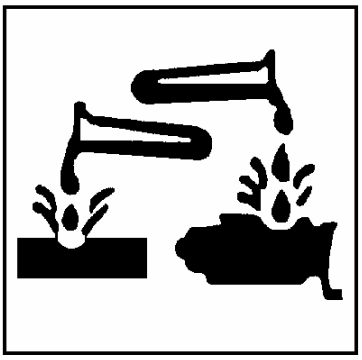
Irritant : Non-corrosive substances which, through contact with skin or mucous membranes, can cause inflammation.

Oxidizing : Substances which may give rise to highly exothermic reaction in contact with oxidizable substances, particularly flammable substances.

CORROSIVE

Black symbol on a yellow or orange background for upper half and white print on a black background for lower half of the diamond.

C



The symbol indicates spilling of liquid from two glass vessels, one attacking a hand, the other metal.

EXPLOSIVE

Black symbol on a yellow or orange background.

E

The symbol indicates an exploding bomb.

FLAMMABLE (LIQUID)

Black symbol on red background.

The symbol indicates flammable liquids.

FLAMMABLE (SOLID)

Black symbol on white background with vertical red stripes.

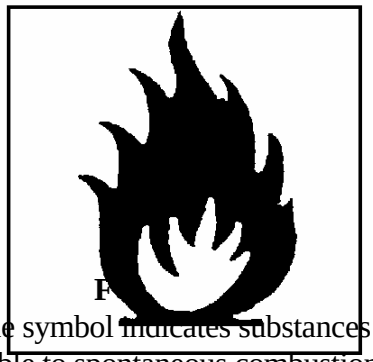
The symbol indicates flammable.

FLAMMABLE (WATER REACTIVE)
Black symbol on blue background.

HIGHLY FLAMMABLE
Black symbol on white background for

upper half and red background for lower half of the diamond.

The symbol indicates substances which in contact with water emit flammable gases.

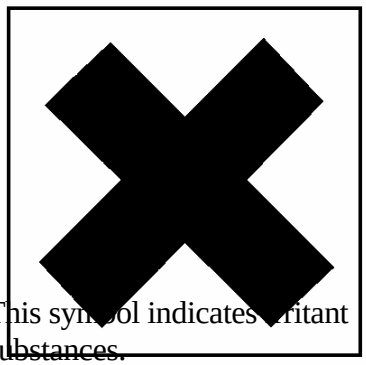


The symbol indicates substances liable to spontaneous combustion.

IRRITANT

Black symbol on yellow or orange background.

Xi

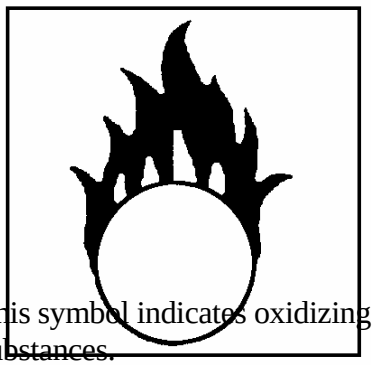


This symbol indicates irritant substances.

OXIDIZING

Black symbol on yellow or orange background.

o



This symbol indicates oxidizing substances.

Note: This symbol is NOT required if the TOXIC or HARMFUL symbol in Appendix A.1 OR the CORROSIVE symbols are used.

For further information on use of these symbols, consult the appropriate local or international legislation on transport of hazardous goods.

APPENDIX A.6: INTERNATIONAL FORMULATION CODEING SYSTEM

The following is the list of formulation types and their international codes as introduced by GIFAP and now adopted by FAO. As far as possible these two letter codes should be used on labels.

CODE	FORMULATION TYPE
AB	Grain bait
AE	Aerosol generator
AL	Other liquids to be applied undiluted
BB	Block bait
BR	Briquette
CB	Bait concentrate
CG	Encapsulated granule
CS	Capsule suspension
DC	Dispersible concentrate
DP	Dustable powder
DS	Powder for seed treatment
EC	Emulsifiable concentrate
ED	Electrochargeable liquid
EO	Emulsion, water in oil
ES	Emulsion, for seed treatment
EW	Emulsion, oil in water
FD	Smoke tin
FG	Fine granule
FK	Smoke candle
FP	Smoke cartridge
FR	Smoke rodlet
FS	Flowable concentrate for seed treatment
FT	Smoke tablet
FU	Smoke generator
FW	Smoke pellet
GA	Gas
GB	Granular bait
GE	Gas generating product
GG	Macrogranule
GP	Flo-dust
GR	Granule
GS	Grease
HN	Hot fogging concentrate
KN	Cold fogging concentrate
LA	Lacquer
LS	Solution for seed treatment
MG	Microgranule
OF	Oil miscible flowable concentrate (oil miscible suspension)
OL	Oil miscible liquid
OP	Oil dispersible powder
PA	Paste
PB	Plate bait
PC	Gel or paste concentrate
PO	Pour-on
PR	Plant rodlet
PS	Seed coated with a pesticide
RB	Ready-to-use-bait
SA	Spot-on
SB	Scrap Bait
SC	Suspension concentrate
SG	Water soluble granules
SL	Soluble concentrate
SO	Spreading concentrate
SP	Water soluble powder
SS	Water soluble powder for seed treatment
SU	Ultra-low volume (ULV) suspension
TB	Tablet
TC	Technical material
TK	Technical concentrate
TP	Tracking powder
UL	Ultra-low volume (ULV) liquid
VP	Vapour releasing product
WG	Water dispersible granules
WP	Wettable powder
WS	Water dispersible powder for slurry treatment
XX	Others

APPENDIX A.7: LABEL CONTENTS

APPENDIX A.7.1: Summary of recommended label content

KEY SUBJECT	POSITION ON LABEL A = Main label B = Ancillary panels C = Label leaflet D - Pre-measured pack * if applicable to packaging	TYPE SIZE REQUIRED L= Large M = Medium S = Small (8 point min.) X =Emphasize by using either capitals, bold or heavy type for heading or part or whole of phrase
Hazard symbols	A, * C and *D	LX
Product name	A, *C and *D	LX
Common name	A and *D	M
Active ingredient statement	A and *D	M
Formulation type	A and *D	M
Solvent statement (if required)	A and *D	L
Summary of uses	A and *C	LX
Net contents	A and *D	M
Date of Manufacture/ Formulation/ Batch Number	B and *C	M
Name and address of manufacturer, distributor, agent or registrant	A and *D	M or S
Registration number	A and *D	M
Directions for use	B and *C	M
Withholding period	B and *C	MX or SX
General instructions for use	B and *C	M or S
Warning phrases and statements for Good Agricultural Practice	B and *C	M

APPENDIX A.7.1: Summary of recommended label content

KEY SUBJECT	POSITION ON LABEL A = Main label B = Ancillary panels C = Label leaflet D - Pre-measured pack * - if applicable to packaging	TYPE SIZE REQUIRED L= Large M = Medium S = Small (8 point min.) X = Emphasize by using either capitals, bold or heavy type for heading or part or whole of phrase
Safety precautions	B and *C	MX
First aid instructions and advice to doctors	B and *C	MX
Legal responsibilities	B and *D	S

NOTE: Where a one panel label is used, all the above information must be included.

APPENDIX A.7.2 Flow chart for checking the draft label

Define User

Who will be utilizing label information?

↓

Determine Label Function

* to inform
* to instruct
* to gather together relevant information
* to persuade user to "READ THE LABEL"

↓

Determine Label Content

(what information should be included?)

↓

Determine Contextual Constraints

* type of container
* extent of information required
* space problems
* possible use of leaflet
* durability of label

↓

Does The Draft Label ←

* present appropriate information?
* present this clearly and concisely?
* use graphics where necessary?
* compare favourably with similar product labels on file?

↓

Review And Edit Information

↓

Evaluate

↓

Does the label achieve its purpose?

↓

YES → Approve draft label for final printing and registration

↓

- Does the printed label read the same as the approved draft?
- Can fold-out labels be read easily?
- Are perforations and other aids effective?

NO → Redraft ↓ ← Does The Draft Label

APPENDIX A.7.3: Check list for reviewing label content

Tick the box to indicate that the label carries the item referred to and that it is satisfactory. Delete item if it is not applicable.

PRODUCT NAME:

Information appearing on the label:

Company name (and correct logo, if applicable)	[ ]
Product name (and logo, if applicable)	[ ]
Product type, e.g. herbicide, insecticide	[ ]
Formulation type, e.g. EC, WP, SC	[ ]
Active ingredient, common name and content	[ ]
Statement of use	[ ]
Net content of pack	[ ]
Instruction to read safety advice before opening pack	[ ]
All trade marks correctly acknowledged	[ ]
Name, address and telephone number of manufacturer, distributor, agent and/or registrant	[ ]
Telephone number for emergency response	[ ]
Label code	[ ]
Storage stability, e.g. expiry date	[ ]
Registration number	[ ]
Registration for batch number and manufacture date	[ ]

Safety Precautions

Any locally required additional precautions	[ ]
"Keep locked up and out of reach of children" warning	[ ]
Safety pictograms	[ ]
A box for first aid/medical treatment	[ ]

Instructions for use:

"Use only as directed" statement	[ ]
Pests controlled	[ ]
Approved uses	[ ]
Method of application	[ ]
Application rates	[ ]
Timing and frequency of application	[ ]
Pre-harvest intervals	[ ]
Re-entry periods	[ ]
Simple language style and clear headings have been used	[ ]
Every statement is clear and unambiguous	[ ]
No information is repeated	[ ]
Complex instructions have been tabulated	[ ]

General:

Print size and style conforms to standards	[ ]
Language will be understood by all users	[ ]
Colour contrast satisfactory	[[
Illustrations unambiguous	[ ]
Does it meet all local regulations?	[ ]

APPENDIX A.8: REFERENCES

1. Guidelines on good labelling practice for pesticides. FAO, Rome. 1985.

2. FAO International Code of Conduct on the Distribution and Use of Pesticides (amended version). FAO, Rome. 1990.

3. Pesticides and Other Agrochemicals -Common Names. ISO Standard 1750 (1981); Addendum 1 (1983); Addendum 2 (1984). International Organization for Standardization, Geneva.

4. IUPAC (Nomenclature of Organic Chemistry, Nomenclature of Inorganic Chemistry). In: Pure Appl. Chem., 1983, 55, 409.

5. Pictograms for agrochemical labels: An aid to the safe handling of pesticides. FAO, Rome. 1988.

6. The WHO recommended classification of pesticides by hazard and guidelines to classification 1994-1995. International Programme on Chemical Safety (WHO/PCS/94.2). Geneva.

7. Manual on the Development and Use of FAO Specifications for Plant Protection Products (4th ed.). FAO, Rome. 1994.

8. Legislation on dangerous substances: Classification and Labelling in the European Communities. EC Publications, Luxembourg. 1987.

(1) and (5) are no longer available and are superseded by this document.