FAO/PL:1967/M/11/1

WHO/Food Add./68.30

**1967 EVALUATIONS OF SOME PESTICIDE RESIDUES IN FOOD**

**THE MONOGRAPHS**

The content of this document is the result of the deliberations of the

Joint Meeting of the FAO Working Party of Experts and the WHO Expert

Committee on Pesticide Residues, which met in Rome, 4 - 11 December,

1967. (FAO/WHO, 1968)

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

WORLD HEALTH ORGANIZATION

Rome, 1968

ALDRIN

This pesticide was evaluated by the 1966 Joint Meeting of the FAO

Working Party and WHO Expert Committee on Pesticide Residues (FAO/WHO,

1967). Since the previous publication, additional information on the

identity of aldrin and the results of additional experimental work

have become available. This new information and work is summarized and

discussed in the following monograph addendum.

IDENTITY

Technical aldrin contains : per cent

HHDN 90.5

Other polychloro hexahydro

dimethanonaphthalenes (isodrin) 3.5

hexachlorotetrahydromethanoindene

(compound 237 or chlordane) 0.5

hexachlorocyclopentadiene (HCCPD) 0.2

hexachlorobutadiene 0.6

octachlorocyclopentene 0.5

hexachloroethane less than 0.1

HHDN diadduct 0.1

bicycloheptadiene (BCH) less than 0.1

toluene 0.3

other compounds\* 3.6

\* Primarily a complex mixture of compounds formed by polymerization

of HCCPD and BCH during the aldrin reaction.

EVALUATION FOR TOLERANCES

USE PATTERN

The annual aldrin and dieldrin production is believed to be in the

order of about 10,000 tons per year, of which aldrin represents the

major portion. Three quarters or more of the total production is used

in agricultural fields, the principal use of both compounds being for

soil treatment. Aldrin residues consist of aldrin and its epoxide

dieldrin.

RESIDUES RESULTING FROM SUPERVISED TRIALS

Rootcrop residues will vary depending on a number of factors such as

the crop, the soil residue, the type of soil, the interval between

treatment or planting and harvest and other factors. In normal

agricultural practice where rates of application usually lie between 1

and 3 kg/ha, rootcrop residues will generally lie below 0.15 ppm,

except for radishes, carrots and chicory roots (CCPR, 1967;

Lichtenstein, 1965).

Most of the residue found in lettuce is in the outer leaves. After

removing these, the residue in the remainder of the head is below 0.1

ppm, even in the case of the highest residues found. Under conditions

of normal soil usage, residues in other vegetables and in fruit range

generally below 0.1 ppm (CCPR, 1967).

Although radio-tracer studies with very young plants have shown that

dieldrin may be translocated (Morley, 1965), field trials under

practical conditions have demonstrated that no detectable residues

occur in the head in the case of wheat nor in the kernel in the case

of maize, nor in stalks and leaves (CCPR, 1967).

In normal practice rotation of forage crops such as alfalfa, meadow

hay and oats or corn leads to no significant residues in the rotated

crops. (CCPR, 1967). An apparent relationship was noticed between the

oil content of the crop and the amount of dieldrin residue found

therein (Bruce, 1966). For example, rotation of soybeans on corn leads

to residues in the beans ranging below 0.1 ppm (CCPR, 1967). However,

processing of such beans to produce edible oils, fats and meals

removes all residues (Smith, 1967).

Foliage application to fruits (e.g. apples, pears, cherries) under

practical conditions leads generally to low residues in the order of

0.05 ppm and lower. Similar application to other crops leads in

general to low residues, except in the straw of cereals at short

intervals between treatment and harvest, e.g. oats (CCPR, 1967). The

persistence of aldrin on foliage has also been studied by Harrison et

al., 1967. They found a very quick transformation of aldrin to

dieldrin on leaves - 50 per cent of insecticide present was in the

form of dieldrin one week after application. After one week total

residues of aldrin and dieldrin were only about 55 per cent and after

7 weeks 27 per cent of that originally applied.

Seed treatment of vegetables and grain crops - general application

rate 0.1 - 0.15 kg/ha -leads to insignificant residues in the crop

(0.02 ppm or less) (CCPR, 1967).

A study of the milk production and the animal feed and water intakes

at certain U.S.A. dairies which were treated annually with aldrin,

showed insignificant levels of residue in the milk and in the feed and

water intakes. (CCPR, 1967).

RESIDUES IN FOOD MOVING IN COMMERCE

Samples of fruit and vegetables offered for sale in the U.S.A. and

Holland showed residues well within the tolerances, except in the case

of carrots in Holland (CCPR, 1967).

RESIDUES IN FOOD AT TIME OF CONSUMPTION

Total diet studies have been made in the U.S.A., Canada and the U.K.

The most comprehensive, those in the U.S.A., have been conducted over

a period of several years. This work has been summarized by Duggan and

Dawson, 1967. Daily intake of aldrin by food classes was in the range

from 0 to 0.001 mg/day.

FATE OF RESIDUES

In soils

Decker et al. (1965) measured the conversion of aldrin to dieldrin in

soil and found that 50 per cent was converted after about 70 days;

however, Edwards and Jeffs (1964) found that about 10 months was

required to convert 50 per cent to dieldrin. On the other hand, Decker

found a half life of aldrin residues (aldrin and dieldrin) below one

month, whereas in the experiments of Edwards and Jeffs this time was

about 19 months. Residue levels of aldrin (mostly present as dieldrin)

do not accumulate indefinitely, as the result of yearly applications

at a constant dosage rate, but will reach a maximum level which is, in

practice, of the order of that resulting from a single annual dose

(Decker, et al, 1965; Elgar, 1966). There is virtually no leaching of

aldrin into deeper soil layers and thus no contamination of ground

water which is eventually used as drinking or irrigation water

(Edwards, 1966; Beynon, Edwards, Thompson, private communication;

Beran and Guth, 1965; Lichtenstein, 1966).

In storage and processing

Most aldrin residues are present as dieldrin although aldrin itself is

better eliminated in processing (Walker, 1965).

NATIONAL TOLERANCES

Country Tolerance, ppm Crop

Canada 0.1 Asparagus, barley,

beans,

cantaloupes,

celery, corn, cowpeas,

cranberries,

eggplants, muskmelons,

oats, peas,

peppers, pimentos,

pumpkins, rye,

soybeans, strawberries,

tomatoes,

watermelons, wheat,

winter squash.

0.25 Beets, beet tops,

broccoli,

Brussels

sprouts, cabbage,

carrots,

cauliflower,

Chinese cabbage,

collards,

cucumbers,

endive, horse-radish,

kale, kohlrabi,

lettuce, mustard

greens, onions,

parsnips, radishes,

rutabagas,

spinach,

squash, Swiss chard,

turnips.

German Federal The residue on

Republic edible crops

may not exceed

the lower limit

of detectability

of the

analytical

methods.

(continued)

Country Tolerance, ppm Crop

Netherlands \* 0.1 fruit and vegetables

aldrin and

dieldrin

\*The Netherlands

tolerances, listed

in the Residue

decree include the

toxic metabolites

and breakdown

products.

In the case of

aldrin, dieldrin is

considered

as the main

metabolite.

In consequence

of this a residue of

aldrin plus dieldrin

together may not

exceed the 0.1

ppm level.

Sweden 0.1 fresh fruits, fresh

berries,

vegetables

including potatoes.

Switzerland 0.1 potatoes.

USA

(Tolerances are

for total residues

of aldrin and its

epoxide dieldrin,

resulting from the

application of

aldrin in or on raw

agricultural

commodities).

(continued)

Country Tolerance, ppm Crop

0.1 (aldrin Asparagus, broccoli,

plus Brussels

dieldrin) sprouts,

cabbage, cantaloupes,

cauliflower, celery,

cherries, cranberries,

cucumbers, eggplant,

grapes, lettuce, mangoes,

muskmelons,

nectarines, peaches,

peppers,

pimentos,

pineapple, plums (fresh

prunes), potatoes,

pumpkins, strawberries,

summer

squash, sweet

potatoes, tomatoes,

watermelons, winter

squash.

zero Alfalfa, apples,

apricots,

beans, black-eyed

peas, carrots, clover,

collards, corn forage,

corn grain, cowpeas,

cowpea hay, endive

(escarole), garden beets,

garden beet tops,

garlic, grain sorghum,

grain sorghum forage,

horse-radish, kale,

kohlrabi,

leeks, lespedeza,

mustard greens, onions,

parsnips, peanuts,

peanut hay, pears, peas,

pea

hay, popcorn,

quinces, radishes,

rutabagas,

salsify tops,

salsify roots, shallots,

soybeans, soybean hay,

spinach, sugarbeets,

sugarbeet

tops, Swiss chard,

turnips, turnip tops.

(continued)

Country Tolerance, ppm Crop

Additional

tolerances

for total

residues of

aldrin

and dieldrin

are established,

on an interim

basis, pending

referral to an

advisory

committee.

0.1 straw of barley, oats,

rice,

rye, wheat

0.05 grapefruit, lemons,

limes,

oranges, rice

grain, tangerines.

0.02 grain of barley, oats,

rye,

wheat.

FAO/WHO RECOMMENDATIONS FOR TOLERANCES

The meeting makes no recommendations for tolerances of aldrin per se,

only for aldrin plus dieldrin - see monograph on latter compound.

FURTHER WORK

Further work desirable

Following limited foliar application, aldrin residues as such were

occasionally detected in total diets (Duggan and Weatherwax, 1967).

Therefore further total diet studies are desired.

REFERENCES PERTINENT TO EVALUATION FOR TOLERANCES

Beran, F. and Guth, J.A. (1965) Das Verhalten organischer insektizider

Stoffe in verschiedensen Böden mit besonderer Berücksichtigung der

Möglichkeit einer Grundwasserkontamination. Pflanzenschutzberichte

(Wein), 33 : 65-117.

Bruce, W.N., Decker, G.C., Wilson, J.G. (1966) The relationship of the

levels of insecticide contamination of crop seeds to their fat content

and soil concentrations of aldrin, heptachlor and their epoxides.

J. Econ. Ent. 59 : 179.

CCPR. Aldrin and dieldrin. (1967) Working paper prepared by the

Netherlands Delegation with the assistance of the United Kingdom

Delegation for the Second Session of the Codex Committee on Pesticide

Residues, The Hague. CCPR 67/12.

Decker, G.C., Bruce, W.N., Bigger, J.H. (1965) The accumulation and

dissipation of residues resulting from the use of aldrin in soils.

J. Econ. Ent. 58 : 266 - 271.

Duggan, R.E., Dawson, K. (1967) Pesticides: a report on residues in

food. FDA Papers 1:5

Duggan, R.E., Weatherwax, J.R. (1967) Dietary intake of pesticide

chemicals. Science 157 : 1006-1010.

Edwards, C.A. (1966) Insecticide residues in soils. Res. Rev. 13 :

83-132.

Edwards, C.A., Jeffs, K.A. (1964) The persistence of some insecticides

in soil and their effects on soil animals. Proc. XII. Int. Congr.

Ent., London, 559-560.

Elgar, K.R. (1966) Analysis of crops and soils for residues of the

soil insecticides aldrin and telodrin. J. Sci. Food Agric. 17 : 541.

FAO/WHO. (1967) Evaluation of some pesticide residues in food. FAO,

PL:CP/15; WHO/Food Add./67.32.

Harrison, R.B., Holmes, D.C., Roburn, J., Tatton, J.O'G. (1967) The

fate of some organochlorine pesticides on leaves. J. Sci. Food Agric.

18 : 10-15.

Lichtenstein, E.P. (1965) Persistence and behaviour of insecticidal

residues in soils and their translocation into crops. Arch. Environs.

Health. 10 : 825-826.

Morley, H.V., Chiba, M. (1965) Dieldrin uptake from soil by wheat

plants. Can. J. Plant Sci. 45 : 209-210.

Smith, et al. (1967) Report on removal of chlorinated pesticides from

crude vegetable oils. Report submitted to U.S. Dept. of Agriculture

and the U.S. Food and Drug Administration in July 1967.

Walker, K.C., Maitlen, J.C., Onsager, J.A., Powell, D.M., Butler,

L.I., Goodban, A.E., McCready, R.M. (1965) The fate of aldrin,

dieldrin and endrin residues during the processing of raw sugar beets.

USDA Bull. ARS 33-107.

See Also:

[Toxicological Abbreviations](http://www.inchem.org/documents/eintro/eintro/abreviat.htm)

[Aldrin (ICSC)](http://www.inchem.org/documents/icsc/icsc/eics0774.htm)

[Aldrin (PIM 573)](http://www.inchem.org/documents/pims/chemical/pim573.htm)

[Aldrin (FAO Meeting Report PL/1965/10/1)](http://www.inchem.org/documents/jmpr/jmpmono/v065pr02.htm)

[Aldrin (FAO/PL:CP/15)](http://www.inchem.org/documents/jmpr/jmpmono/v66apr02.htm)

[Aldrin (IARC Summary & Evaluation, Supplement7, 1987)](http://www.inchem.org/documents/iarc/suppl7/aldrin.html)

[Aldrin (IARC Summary & Evaluation, Volume 5, 1974)](http://www.inchem.org/documents/iarc/vol05/aldrin.html)