

SYNTHESIS OF COMMERCIAL HERBICIDES

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and

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PREFACE

The purpose of this book is to outline and discuss the chemical methods of synthesis of commercial herbicides.

The commercial herbicides are arranged according to chemical classes, and each class is treated as an individual chapter. Every chapter begins with a table which lists the product and chemical name, chemical structure, physical properties, pertinent patents with dates of issuance, and major herbicidal uses of each compound.

The second section of each chapter describes the methods of preparation and lists detailed synthesis procedures which can be used to prepare the compounds in each chemical class. In cases where the class is large and experimental conditions overlap, representative procedures are supplied. The third section of each chapter lists the literature references from which the material in each chapter is extracted.

Since this work is devoted primarily to methods of synthesis, there is no detailed discussion of biological activity.

This book should find extensive use in industrial, governmental and university environments. It should be a valuable source for quickly locating experimental conditions for preparing commercial herbicides and related compounds. In addition it should allow chemists and biologists to quickly survey synthesis work carried out in each chemical class of herbicides. The carefully prepared tables should be useful in observing trends, detecting areas which need further investigation and in preparing new herbicidally active compounds by extending or combining structures of known herbicidal activity. The patent and manufacturing information should also prove valuable to engineering, patent and commercial development personnel.

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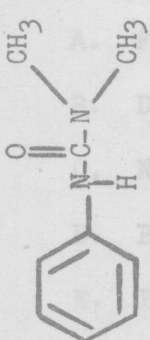
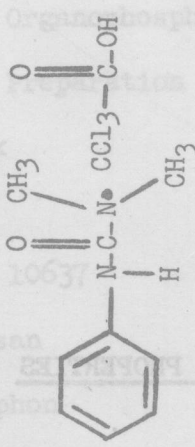
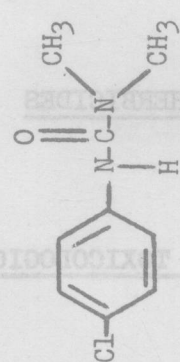
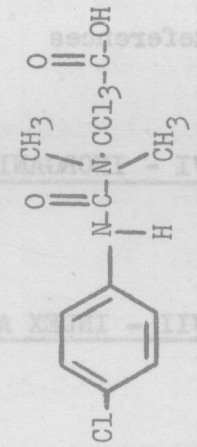
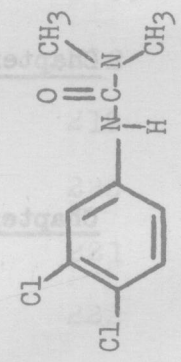
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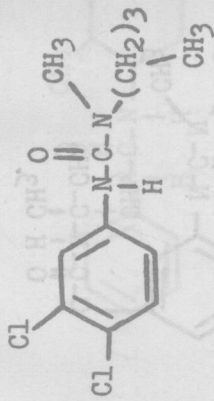
TABLE I

UREA HERBICIDES

PRODUCT NAME	CHEMICAL NAME	CHEMICAL STRUCTURE	PHYSICAL PROPERTIES	U.S. PATENTS	HERBICIDAL USES
FENURON	3-Phenyl-1,1-dimethylurea		m.p. 133-134°	2,655,447 (1953)	Brush control
FENURON TCA	3-Phenyl-1,1-dimethylurea trichloroacetate		m.p. 65-68°	2,782,112 (1957)	Brush control and temporary soil sterilization
MONURON	3-(p-Chlorophenyl)-1,1-dimethylurea		m.p. 174-175°	2,655,445 (1953)	Pre-emergence control of broadleaf and grass weeds
MONURON TCA	3-(4-Chlorophenyl)-1,1-dimethylurea trichloroacetate		m.p. 78-81°	2,782,112 (1957)	Soil sterilization
DIURON	3-(3,4-Dichlorophenyl)-1,1-dimethylurea		m.p. 158-159°	2,655,445 (1953)	Pre-emergence control of broadleaf and grass weeds

NEBURON

1-Butyl-3-(3,4-dichlorophenyl)-1-methylurea

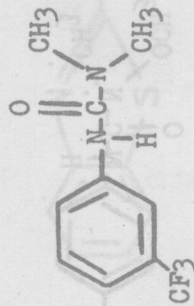


m.p. 102-103°
2,655,447
(1953)

Pre-emergence control
of broadleaf and
grass weeds

FLUOMETURON

1,1-Dimethyl-3-(α,α -trifluoro-m-tolyl)urea

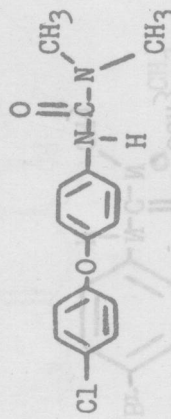


m.p. 163-164°
Brit.
914,779
(1963)

Pre-emergence control
of broadleaf and
grass weeds

CHLOROXURON

3-(p-Chlorophenoxy-phenyl)-1,1-dimethylurea

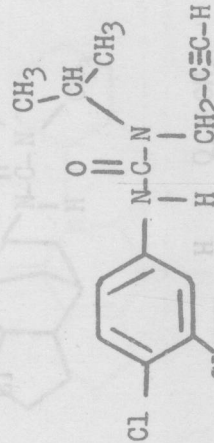


m.p. 151-152°
3,060,235
(1962)

Pre-emergence control
of broadleaf and
grass weeds

PROBAN

1-(3,4-Dichlorophenyl)-3-isopropyl-3-(propynyl)urea

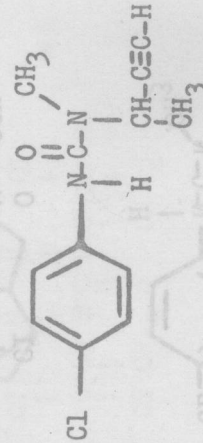


m.p. 84-85°
2,867,520
(1959)

Pre-emergence selective
control of weeds in
cereal crops

BUTURON

N-p-Chlorophenyl-N'-methyl-N'-isobutynyl urea

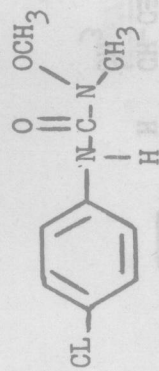


m.p. 148-149°
3,149,955
(1964)

Pre-emergence selective
control of weeds in
cereal crops

MONOLINURON

3-(p-Chlorophenyl)-l-methoxy-l-methylurea



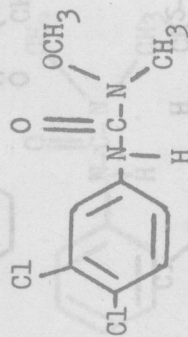
m.p. 83-84°

2,960,534
(1960)

Pre-emergence control
of broadleaf and
grass weeds

LINURON

3-(3,4-Dichlorophenyl)-l-methoxy-l-methylurea



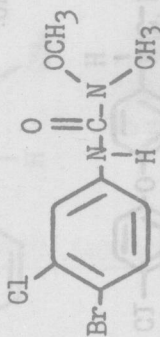
m.p. 93-94°

2,960,534
(1960)

Pre-and Post-emergence control of broadleaf and grass weeds

MALORAN

3-(4-Bromo-3-chlorophenyl)-l-methoxy-l-methylurea



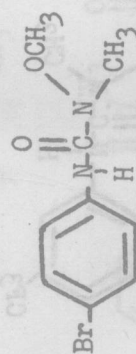
m.p. 94-96°

SWISS
405,821
(1966)

Pre-emergence control of broadleaf and grass weeds

MEIOBROMURON

3-(p-Bromophenyl)-l-methoxy-l-methylurea



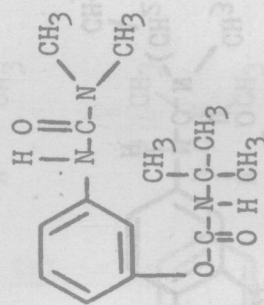
m.p. 95-96°

2,793,224
(1955)

Pre-emergence control of broadleaf and grass weeds

TANDEX

m-(3,3-Dimethylureido)-phenyl-t-butylcarbamate



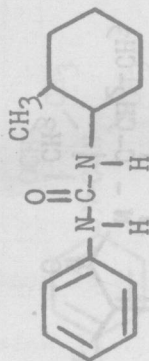
m.p.
169-169.5°

3,434,822
(1969)

Soil sterilization

SIDURON

1-(2-Methylcyclohexyl)-
-3-phenylurea



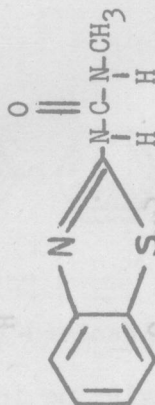
m.p. 133-138°

Pre-emergence
control of grass
weeds

3,309,192
(1967)

BENZTHIAZURON

1-Methyl-3-
(2-benzthiazolyl)urea



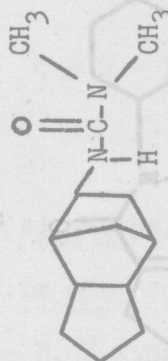
m.p. 265°

Pre-emergence
selective control
of weeds in corn,
beets and cotton

Brit.
1,004,469
(1965)

NOREA

3-(Hexahydro-4,7-
methanoindan-5-yl)-
1,1-dimethylurea



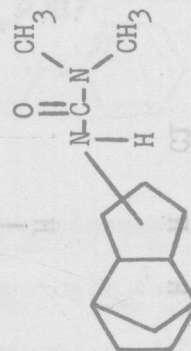
m.p. 171-172°

Pre-emergence
control of broadleaf
and grass weeds

3,150,179
(1964)

H-210

N-1-or 2-(4,5,6,7,8,9-
hexahydro-4,7-methanoindanyl)]-N'-
dimethylurea



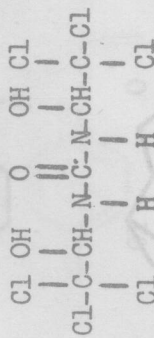
m.p. 154-156°

Pre-emergence control
of broadleaf and
grass weeds

Ger.
1,200,062
(1965)

DCU

1,3-Bis(1-hydroxy-2,2,2-trichloroethyl)urea



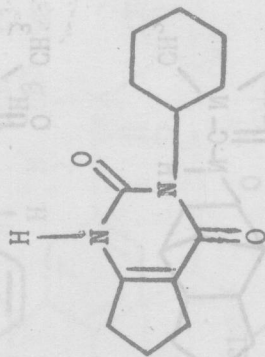
m.p. 200°

2,619,416
(1952)

Pre-emergence control of grasses

LENACIL

3-Cyclohexyl-6,7-dihydro-1H-cyclopentapyrimidine-2,4-(3H,5H)-dione



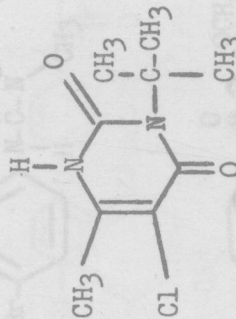
m.p. 315.5-316.5°

Brit.
968,662
(1964)

Selective control of weeds in sugarbeets

TERBACIL

3-t-Butyl-5-chloro-6-methyluracil



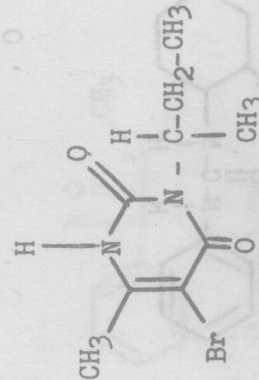
m.p. 175-177°

3,235,357
(1966)

Selective control of weeds in various fruit

BROMACIL

5-Bromo-3-sec-butyl-6-methyluracil



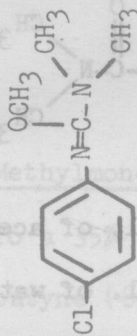
m.p. 158-159°

3,235,357
(1966)

Soil sterilization

TRIMETURON

N-(p-Chlorophenyl)-
N,N-dimethyl-
O-methylisourea



b.p. 155-160°
at 14mm

Brit.
904,706
3,280,190
(1966)

General plant
growth control