

- 1 -

REPLACED SHEETS	SG
☒ Description : paged to paged	
☒ Claim(s) : paged ... ~~31~~ ... to paged ... ~~50~~ ...	
☐ Drawing(s) : paged to paged	
☐ Abstract : paged to paged	
DATE OF RECEIPT	

N-AMINOALKYLCARBONYLOXYALKYLPYRROLE INSECTICIDAL
ACARICIDAL AND MOLLUSCICIDAL AGENTS

Insects, acarina and mollusks destroy growing
 5 and harvested crops. In the United States alone,
 agronomic crops must compete with thousands of insect
 and acarid species. Accordingly, there is ongoing
 research to create new and more effective insecticides,
 acaricides and molluscicides for the control of in-
 10 sects, acarina and mollusks and for the protection of
 plants from attack by insects, acarina and mollusks.
 There is also ongoing research to create new insecti-
 cides and acaricides to overcome the resistance ob-
 served with several classes of insecticidal and
 15 acaricidal agents.

The present invention describes N-amino-
 alkylcarbonyloxyalkylpyrrole compounds which are useful
 as insecticidal, acaricidal and molluscicidal agents
 for the control of insects, acarina and mollusks and
 20 for the protection of plants from attack by insects,
 acarina and mollusks.

This invention also relates to compositions
 containing those compounds and methods for using those
 compounds and compositions. Advantageously, it has
 25 been found that the N-aminoalkylcarbonyloxyalkylpyrrole
 compounds of the present invention, and compositions
 containing them, are effective insecticidal, acaricidal
 and molluscicidal agents for the control of insects,

This Sheet Has Been Replaced

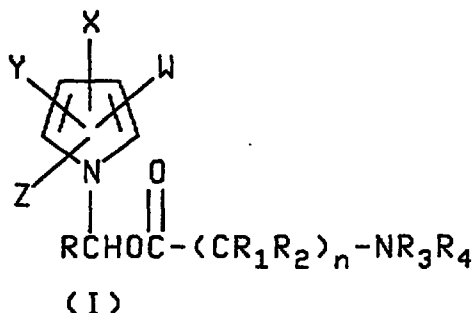


acarina and mollusks and for the protection of plants from attack by insects, acarina and mollusks. The compounds of the present invention are especially useful for the control of tobacco budworms.

Advantageously, the present invention provides a method for controlling insects, acarina and mollusks by contacting said insects, acarina and mollusks, their breeding grounds, food supply or habitat with an insecticidally, acaricidally or molluscicidally effective amount of a formula I, N-aminoalkylcarbonyloxyalkylpyrrole compound.

The present invention also provides a method for protecting growing plants from attack by insects, acarina and mollusks by applying to the foliage of said plants or to the soil or water in which they are growing an insecticidally, acaricidally or molluscicidally effective amount of a formula I, N-aminoalkylcarbonyloxyalkylpyrrole compound.

The N-aminoalkylcarbonyloxyalkylpyrrole compounds of the present invention have the following structural formula I:



wherein

W is CN, NO₂, S(O)_mCF₂R₅ or CNR₆R₇;
 R_5 is hydrogen, F, Cl, Br, CF₂H, CCl₂H, CClFH, CF₃ or CCl₃;

m is an integer of 0, 1 or 2;

R₆ and R₇ are each independently hydrogen,

C₁-C₄ alkyl optionally substituted with one or more halogen atoms, or

5 phenyl optionally substituted with one or more halogen atoms,

NO₂ groups,

CN groups,

10 C₁-C₄ alkyl groups optionally substituted with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted with one or more halogen atoms;

X is halogen, CF₃, CN, NO₂, S(O)_mCF₂R₅ or

15 phenyl optionally substituted with one or more halogen atoms,

NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally substituted with one or more halogen atoms, or

20 C₁-C₄ alkoxy groups optionally substituted with one or more halogen atoms;

Y is halogen, CF₃ or

phenyl optionally substituted with one or more halogen atoms,

25 NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally substituted with one or more halogen atoms, or

30 C₁-C₄ alkoxy groups optionally substituted with one or more halogen atoms;

Z is hydrogen, halogen or CF₃;

R is hydrogen or C₁-C₄ alkyl;

R₁ and R₂ are each independently hydrogen,

35 C₁-C₆ alkyl optionally substituted with one or more halogen atoms,

C_1-C_6 alkoxy optionally substituted with
one or more halogen atoms, or
phenyl optionally substituted with one or
more halogen atoms,

5

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally sub-
stituted with one or more halogen
atoms, or

10

C_1-C_4 alkoxy groups optionally sub-
stituted with one or more halogen
atoms, or

15

when R_1 and R_2 are taken together with the atom to
which they are attached may form a C_3-C_6 cyclo-
alkyl group optionally substituted with one to
three C_1-C_4 alkyl groups, C_2-C_6 alkenyl groups or
phenyl groups, or

20

R_1 or R_2 may be taken together with R_3 and the
atoms to which they are attached to form a 4- to
7-membered heterocyclic ring;

n is an integer of 1, 2, 3 or 4;

R_3 is hydrogen,

C_1-C_6 alkyl,

C_2-C_6 alkenyl,

25

C_2-C_6 alkynyl, or

phenyl optionally substituted with one or more
halogen atoms,

NO_2 groups,

CN groups,

30

C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms, or

R_3 may be taken together with either R_1 or R_2 and the atoms to which they are attached to form a 4- to 7-membered heterocyclic ring;

R_4 is hydrogen,

5

C_1-C_6 alkyl,

C_2-C_6 alkenyl,

C_2-C_6 alkynyl,

phenyl optionally substituted with one or more halogen atoms,

10

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted with one or more halogen atoms,

15

$C(A)R_8$,

$C(A)R_9$,

CN,

SO_2R_{10} , or

20

$C(O)CHR_{11}NHR_{12}$;

A is O or S;

R_8 is C_1-C_6 alkyl optionally substituted with one to three halogen atoms,

C_2-C_6 alkenyl,

25

C_2-C_6 alkynyl, or

phenyl optionally substituted with one or more halogen atoms,

NO_2 groups,

CN groups,

30

C_1-C_4 alkyl groups optionally substituted with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted with one or more halogen atoms;

R_9 is OR_{13} , CO_2R_{13} or $NR_{14}R_{15}$;

35

R_{13} is C_1-C_6 alkyl optionally substituted with one

phenyl group, or
phenyl optionally substituted with one or more
halogen atoms,
NO₂ groups,
CN groups,
C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or
C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;

5

10

R₁₄ and R₁₅ are each independently hydrogen or C₁-C₄
alkyl;

R₁₀ is NR₁₄R₁₅,

C₁-C₆ alkyl,

C₂-C₆ alkenyl,

C₂-C₆ alkynyl, or

15

phenyl optionally substituted with one or more
halogen atoms,

NO₂ groups,

CN groups,

20

C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;

R₁₁ is hydrogen,

25

C₁-C₄ alkyl optionally substituted with
one hydroxy group,

one SR₁₆ group,

one C(O)NH₂ group,

one NH₂ group,

30

one NHC(=NH)NH₂ group,

one CO₂H group,

one phenyl group optionally substituted with
one hydroxy group,

one 3-indolyl group or

35

one 4-imidazolyl group;

R_{16} is hydrogen or C_1-C_4 alkyl;

R_{12} is $C(A)R_{17}$; and

R_{17} is C_1-C_6 alkyl optionally substituted with one or more halogen atoms,

5 C_1-C_6 alkoxyalkyl,

C_1-C_6 alkylthio,

phenyl optionally substituted with one or more halogen atoms,

NO_2 groups,

10 CN groups,

C_1-C_4 alkyl groups optionally substituted with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted with one or more halogen atoms,

15 OR_{13} ,

$NR_{14}R_{15}$, or

CO_2R_{13} .

Preferred formula I compounds of the invention are those wherein

20

W is CN, NO_2 , $S(O)_mCF_2R_5$ or $CN\overset{\overset{S}{||}}{R_6}R_7$;

R_5 is hydrogen, F, Cl, Br, CF_2H , CCl_2H , $CClFH$, CF_3 or CCl_3 ;

m is an integer of 0, 1 or 2;

25

R_6 and R_7 are each independently hydrogen or C_1-C_4 alkyl;

X is Cl, Br, CF_3 or

phenyl optionally substituted with one or more halogen atoms,

30

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted

35

with one or more halogen atoms;

Y is Cl, Br, CF₃ or

phenyl optionally substituted with one or more
halogen atoms,

NO₂ groups,

5 CN groups,

C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;

10 Z is Cl, Br or CF₃;

R is hydrogen;

R₁ and R₂ are each independently hydrogen,

C₁-C₆ alkyl optionally substituted with one
or more halogen atoms, or

15 phenyl optionally substituted with one or more
halogen atoms,

NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally substituted with
one or more halogen atoms, or

20 C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;

n is an integer of 1 or 2;

R₃ is hydrogen or C₁-C₆ alkyl;

25 R₄ is C(A)R₈, C(A)R₉, SO₂R₁₀ or C(O)CHR₁₁NHR₁₂;

A is O;

R₈ is C₁-C₆ alkyl optionally substituted with one to
three halogen atoms, or

phenyl optionally substituted with one or more
halogen atoms,

30 NO₂ groups,
CN groups,

C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms;

R_9 is OR_{13} or CO_2R_{13} ;

R_{13} is C_1-C_6 alkyl optionally substituted with one
phenyl group or one to three halogen atoms,
or

phenyl optionally substituted with one or more
halogen atoms,

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms;

R_{10} is C_1-C_6 alkyl, or

phenyl optionally substituted with one or more
halogen atoms,

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms;

R_{11} is hydrogen or C_1-C_4 alkyl;

R_{12} is $C(A)R_{17}$; and

R_{17} is C_1-C_6 alkyl optionally substituted with one or
more halogen atoms, or

phenyl optionally substituted with one or more
halogen atoms,

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms.

More preferred insecticidal, acaricidal, and molluscicidal compounds of this invention are those wherein

W is CN or $S(O)_mCF_3$;

5 m is an integer of 0, 1 or 2;

X is phenyl optionally substituted with one or more halogen atoms,
NO₂ groups,
CN groups,

10 C₁-C₄ alkyl groups optionally substituted with one or more halogen atoms, or
C₁-C₄ alkoxy groups optionally substituted with one or more halogen atoms;

Y is Cl or Br;

15 Z is Cl, Br or CF₃;

R is hydrogen;

R₁ and R₂ are each independently hydrogen,
C₁-C₆ alkyl optionally substituted with one or more halogen atoms, or
20 phenyl optionally substituted with one or more halogen atoms;

NO₂ groups,

CN groups,

25 C₁-C₄ alkyl groups optionally substituted with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted with one or more halogen atoms;

30 n is an integer of 1 or 2;

R₃ is hydrogen or C₁-C₆ alkyl;

R₄ is C(A)R₈, C(A)R₉, SO₂R₁₀ or C(O)CHR₁₁NHR₁₂;

A is O;

35 R₈ is C₁-C₆ alkyl optionally substituted with one to three halogen atoms, or

phenyl optionally substituted with one or
more halogen atoms,
NO₂ groups,
CN groups,
5 C₁-C₄ alkyl groups optionally sub-
stituted with one or more halogen
atoms, or
C₁-C₄ alkoxy groups optionally sub-
stituted with one or more halogen
10 atoms;

R₉ is OR₁₃ or CO₂R₁₃;

R₁₃ is C₁-C₆ alkyl optionally substituted with one
phenyl group or one to three halogen atoms;

R₁₀ is phenyl optionally substituted with one or more
15 halogen atoms,

NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or

20 C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;

R₁₁ is hydrogen;

R₁₂ is C(A)R₁₇; and

R₁₇ is phenyl optionally substituted with one or more
25 halogen atoms,

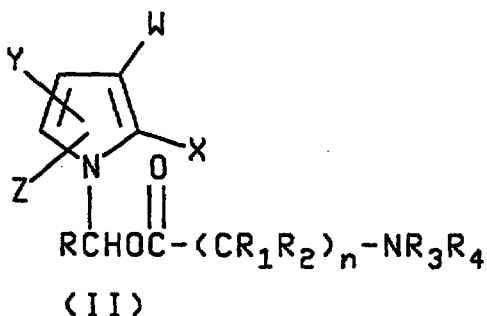
NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or

30 C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms.

Most preferred compounds of this invention
which are especially effective insecticidal, acaricidal
and molluscicidal agents are those having the structur-
35 al formula II:



10 wherein

W is CN or $S(O)_mCF_3$;

m is an integer of 0, 1 or 2;

X is phenyl optionally substituted with one or more
halogen atoms,

15 NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted
20 with one or more halogen atoms;

Y is Cl or Br;

Z is Cl, Br or CF_3 ;

R is hydrogen;

R_1 and R_2 are each independently hydrogen,

25 C_1-C_6 alkyl optionally substituted with one
or more halogen atoms, or

phenyl optionally substituted with one or
more halogen atoms;

NO_2 groups,

30 CN groups,

C_1-C_4 alkyl groups optionally sub-
stituted with one or more halogen
atoms, or

C_1-C_4 alkoxy groups optionally sub-
stituted with one or more halogen
35 atoms;

n is an integer of 1 or 2;

R₃ is hydrogen or C₁-C₆ alkyl;

R₄ is C(A)R₈, C(A)R₉, SO₂R₁₀ or C(O)CHR₁₁NHR₁₂;

A is O;

5 R₈ is C₁-C₆ alkyl optionally substituted with one to three halogen atoms, or

phenyl optionally substituted with one or more halogen atoms,

NO₂ groups,

10 CN groups,

C₁-C₄ alkyl groups optionally substituted with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted with one or more halogen atoms;

15 R₉ is OR₁₃ or CO₂R₁₃;

R₁₃ is C₁-C₆ alkyl optionally substituted with one phenyl group or one to three halogen atoms;

R₁₀ is phenyl optionally substituted with one or more halogen atoms,

20 NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally substituted with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted with one or more halogen atoms;

25 R₁₁ is hydrogen;

R₁₂ is C(A)R₁₇; and

R₁₇ is phenyl optionally substituted with one or more halogen atoms,

30 NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally substituted with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted with one or more halogen atoms.

35

Advantageously, it has been found that the formula I compounds of the present invention are especially useful for the control of tobacco budworms, southern armyworms and two-spotted spider mites.

10

15



30

phenyl optionally substituted with one or two
halogen, CN, NO₂, C₁-C₄ alkyl, C₁-C₄ alkoxy
or CF₃ groups,

35

2- or 3-thienyl or

2- or 3-furyl;
X₁ is Cl or Br; and
W, X, Y, Z, R, R₁, R₂, R₃, R₄ and n are as described
hereinabove for formula I.

5 The appropriately substituted pyrrole of
formula III is reacted with an alkylating agent of
formula IV in the presence of an alkali metal hydride
or an alkali metal C₁-C₆ alkoxide to form an N-alka-
noylaminomethyl or N-aroylaminomethylpyrrole of formula
10 V, said formula V aminomethylpyrrole is then reacted
with an excess of phosphorus oxychloride or phosphorus
oxybromide to form a 1-halomethylpyrrole of formula VI.
Said 1-halomethylpyrrole is reacted with a carboxylic
acid of formula VII in the presence of an alkali metal
15 hydroxide, such as sodium or potassium hydroxide, to
form desired N-aminoalkylcarbonyloxyalkylpyrroles of
formula I.

 The N-aminoalkylcarbonyloxyalkylpyrrole
compounds of the present invention are effective for
20 controlling insects, acarina and mollusks . Those
compounds are also effective for protecting growing or
harvested crops from attack by insects and acarina.

 Insects controlled by the formula I compounds
of this invention include Lepidoptera such as tobacco
25 budworms, cabbage loopers, cotton boll worms, beet
armyworms, southern armyworms and diamondback moths;
Homoptera such as aphids, leaf hoppers, plant hoppers
and white flies; Thysanoptera such as thrips; Coleop-
tera such as boll weevils, Colorado potato beetles,
30 southern corn rootworms and mustard beetles; and
Orthoptera such as locusts, crickets, grasshoppers and
cockroaches. Acarina controlled by the compounds of
this invention include mites such as two-spotted spider
mites, carmine spider mites, banks grass mites, straw-
35 berry mites, citrus rust mites and leprosis mites.

Mollusks controlled by the compounds of this invention include gastropoda such as snails, slugs, cowries and limpets. Advantageously, it has been found that the compounds of the present invention are especially effective against tobacco budworm third-instar larvae, southern armyworms and two-spotted spider mites.

In practice, generally about 10 ppm to 10,000 ppm and preferably about 100 ppm to 5,000 ppm of a formula I N-aminoalkylcarbonyloxyalkylpyrrole compound, dispersed in water or another liquid carrier, is effective when applied to the plants, the crops or the soil in which said crops are growing to protect said crops from attack by insects, acarina and mollusks.

The formula I compounds of this invention are also effective for controlling insects, acarina and mollusks, when applied to the foliage of plants and/or to the soil or water in which said plants are growing in sufficient amount to provide a rate of from about 0.100 kg/ha to 4.0 kg/ha of active ingredient.

While the compounds of this invention are effective for controlling insects, acarina and mollusks when employed alone, they may also be used in combination with other biological chemicals, including other insecticides, acaricides and molluscicides. For example, the formula I compounds of this invention may be used effectively in conjunction or combination with pyrethroids, phosphates, carbamates, cyclodienes, endotoxin of bacillus thuringiensis (Bt), formamidines, phenol tin compounds, chlorinated hydrocarbons, benzoylphenyl ureas and the like.

The compounds of this invention may be formulated as emulsifiable concentrates, flowable concentrates, or wettable powders which are diluted with water or other suitable polar solvent, generally

in situ, and then applied as a dilute spray. Said compounds may also be formulated in dry compacted granules, granular formulations, dusts, dust concentrates, suspension concentrates, microemulsions and the like all of which lend themselves to seed, soil, water and/or foliage applications to provide the requisite plant protection. Such formulations include the compounds of the invention admixed with inert, solid or liquid diluents.

For example, wettable powders, dusts, and dust concentrate formulations can be prepared by grinding and blending together about 25% to about 85% by weight of formula I compounds and about 75% to about 15% by weight of a solid diluent such as bentonite, diatomaceous earth, kaolin, attapulgite, or the like, about 1% to 5% by weight of a dispersing agent such as sodium lignosulfonate, and about 1% to 5% by weight of a nonionic surfactant, such as octylphenoxy polyethoxy ethanol, nonylphenoxy polyethoxy ethanol or the like.

A typical emulsifiable concentrate can be prepared by dissolving about 15% to about 70% by weight of an N-aminoalkylcarbonyloxyalkylpyrrole compound in about 85% to about 30% by weight of a solvent such as isophorone, toluene, butyl cellosolve, methyl acetate, propylene glycol monomethyl ether, or the like and dispersing therein about 1% to 5% by weight of a nonionic surfactant such as an alkylphenoxy polyethoxy alcohol.

An especially effective method for controlling terrestrial gastropods with the formula I compounds of the invention, is to proffer the active molluscicidal material in the form of a bait formulation. These bait formulations can be widely varied but generally contain about 1% to 20% by weight of the active ingredient, about 40% to 50% by weight of solid

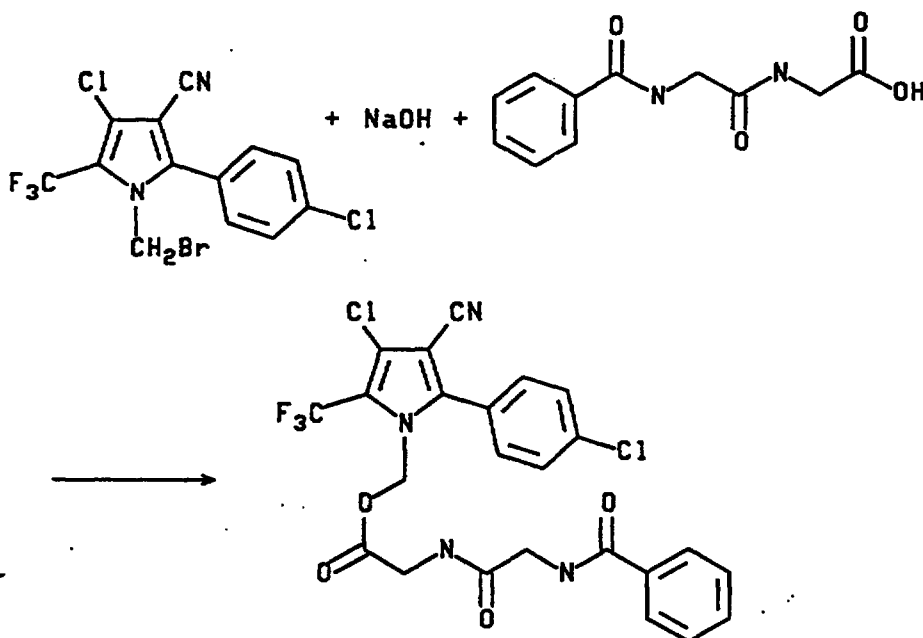
edible nutritive substance, about 5% to 10% by weight of a carbohydrate source such as sugar, molasses, corn syrup or the like and the remainder of the formulation, i.e. about 30% to 50% by weight of water or other consumable liquid.

5 .

In order to facilitate a further understanding of the invention, the following examples are presented to illustrate more specific details thereof. The invention is not to be limited thereby except as defined in the claims.

EXAMPLE 1

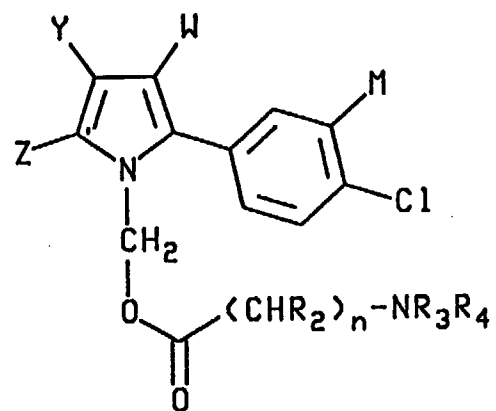
Preparation of [3-Chloro-5-(p-chlorophenyl)-4-cyano-5-(trifluoromethyl)pyrrol-1-yl]methyl N-(N-benzoyl-glycyl)glycinate



1-(Bromomethyl)-4-chloro-2-(p-chlorophenyl)-5-(trifluoromethyl)pyrrole-3-carbonitrile (2.0 g, 5.02 mmol) is added to a mixture of benzoylglycylglycine (1.41 g, 5.97 mmol) and sodium hydroxide (0.24 g, 6.0 mmol) in N,N-dimethylformamide. The reaction mixture is stirred overnight at room temperature, diluted with water and extracted with ethyl acetate. The combined organic extracts are washed sequentially with water and brine, dried over MgSO_4 and concentrated in vacuo to obtain a brown oil. The oil is chromatographed using silica gel and a 60:40 methylene chloride/ethyl acetate mixture to give the title product as a tan solid (1.55 g, mp $65^\circ\text{--}67^\circ\text{C}$).

Using essentially the same procedure, but substituting the appropriately substituted 1-(halo-methyl)-2-arylpyrrole for 1-(bromomethyl)-4-chloro-2-

5 (p-chlorophenyl)-5-(trifluoromethyl)pyrrole-3-carbo-
nitrile and the appropriately substituted carboxylic
acid for benzoylglycylglycine, the following compounds
are obtained:



<u>M</u>	<u>W</u>	<u>Y</u>	<u>Z</u>	<u>R₂</u>	<u>n</u>	<u>R₃</u>	<u>R₄</u>	<u>mp °C</u>
H	CN	Cl	CF ₃	H	1	H	-C(O)OCH ₂ C ₆ H ₅	glass
H	CN	Cl	CF ₃	H	1	H	-C(O)-(p-Cl-C ₆ H ₅)	162 - 163
H	CN	Br	CF ₃	H	2	H	-C(O)-(p-F-C ₆ H ₅)	139 - 141
H	CN	Br	CF ₃	-(p-Cl-C ₆ H ₅)	1	H	-C(O)OC(CH ₃) ₃	115 - 117
H	CN	Br	CF ₃	H	1	H	-C(O)-(p-Cl-C ₆ H ₅)	73 - 75

<u>M</u>	<u>W</u>	<u>Y</u>	<u>Z</u>	<u>R₂</u>	<u>n</u>	<u>R₃</u>	<u>R₄</u>	<u>mp^oC</u>
H	CN	Cl	CF ₃	H	1	H	-C(O)C ₆ H ₅	149 - 150
H	CN	Cl	CF ₃	H	1	H	-C(O)CH ₃	86 - 88
H	CN	Cl	CF ₃	H	2	H	-C(O)CF ₃	110 - 111
H	CN	Cl	CF ₃	H	1	CH ₃	-C(O)C(O)OC ₂ H ₅	141 - 143
H	CN	Cl	CF ₃	H	1	H	-S(O) ₂ C ₆ H ₅	100 - 102
H	CN	Cl	CF ₃	-CH(CH ₃) ₂	1	H	-S(O) ₂ -(p-Cl-C ₆ H ₅)	148 - 149
H	S(O) ₂ CF ₃	Br	Br	H	1	H	-C(O)-(p-Cl-C ₆ H ₅)	74 - 78
Cl	CN	Cl	Cl	H	1	H	-C(O)-(p-Cl-C ₆ H ₅)	111 - 116
H	CN	Cl	CF ₃	H	1	H	-C(O)CH ₃	oil

EXAMPLE 2

Insecticide and acaricide evaluations

The following tests show the efficacy of the compounds as insecticides and acaricides. The evaluations are conducted with solutions of test compounds dissolved or dispersed in 50/50 acetone/water mixtures. The test compound is technical material dissolved or dispersed in said acetone/water mixtures in sufficient amount to provide the concentrations set forth in Table I below.

All concentrations reported herein are in terms of active ingredient. All tests are conducted in a laboratory maintained at about 27°C. The rating system employed is as follows:

Rating System

0 = no effect	5 = 56-65% kill
1 = 10-25% kill	6 = 66-75% kill
2 = 26-35% kill	7 = 76-85% kill
3 = 36-45% kill	8 = 86-99% kill
4 = 46-55% kill	9 = 100% kill
	- = no evaluation

The test species of insects used in the present evaluations along with specific test procedures are described below.

Spodoptera eridania 3rd instar larvae, southern armyworm

A sieva lima bean leaf expanded to 7 to 8 cm in length is dipped in the test suspension with agitation for 3 seconds and placed in a hood to dry. The leaf is then placed in a 100x10 mm petri dish containing a damp filter paper on the bottom and 10 3rd instar

caterpillars. The dish is maintained for 5 days before observations are made of mortality, reduced feeding or any interference with normal moulting.

5 Tetranychus urticae (OP-resistant strain), 2-spotted spider mite

10 Sieva lima bean plants with primary leaves expanded to 7 to 8 cm are selected and cut back to one plant per pot. A small piece is cut from a leaf taken from the main colony and placed on each leaf of the test plants. This is done about 2 hours before treatment to allow the mites to move over to the test plant and to lay eggs. The size of the cut piece is varied to obtain about 100 mites per leaf. At the time of the treatment, the piece of leaf used to transfer the mites is removed and discarded. The mite-infested plants are
15 dipped in the test formulation for 3 seconds with agitation and set in the hood to dry. Plants are kept for 2 days before estimates of adult kill are made.

20 Empoasca abrupta, adults, western potato leafhopper

 A sieva lima bean leaf about 5 cm long is dipped in the test formulation for 3 seconds with agitation and placed in a hood to dry. The leaf is
25 placed in a 100x10 mm petri dish containing a moist filter paper on the bottom. About 10 adult leafhoppers are added to each dish and the treatments are kept for 3 days before mortality counts are made.

30 Heliothis virescens, 3rd instar tobacco budworm

 Cotton cotyledons are dipped in the test formulation and allowed to dry in a hood. When dry, each is cut into quarters and ten sections placed individually in 30 mL plastic medicine cups containing
35 a 5 to 7 mm long piece of damp dental wick. One 3rd

instar caterpillar is added to each cup and a cardboard lid placed on the cup. Treatments are maintained for 3 days before mortality counts and estimates of reduction in feeding damage are made.

5

Diabrotic undecimpunctata howardi, 3rd instar southern corn rootworm

One cc of fine talc is placed in a 30 mL wide-mouth screw-top glass jar. One mL of the appropriate acetone test solution is pipetted onto the talc so as to provide 1.25 and 0.25 mg of active ingredient per jar. The jars are set under a gentle air flow until the acetone is evaporated. The dried talc is loosened, 1 cc of millet seed is added to serve as food for the insects and 25 mL of moist soil is added to each jar. The jars are capped and the contents thoroughly mixed on a Vortex Mixer. Following this, ten 3rd instar rootworms are added to each jar and the jars are loosely capped to allow air exchange for the larvae. The treatments are held for 6 days before mortality counts are made. Missing larvae are presumed dead, since they decompose rapidly and can not be found. The concentrations used in this test correspond approximately to 50 and 10 kg/ha, respectively.

10

15

20

25

The data obtained for the above described evaluations are reported in Table I.

TABLE I

Insecticide And Acaricide Evaluations

Compound	Armyworm			OP-Resistant Mites		Leaf hopper		Tobacco Budworm			Southern Corn Rootworm	
	(ppm)			(ppm)		(ppm)		(ppm)			(kg/ha)	
	1000	100	10	300	100	100	10	1000	100	10	50	10
[3-Chloro-5-(p-chloro-phenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-(p-chlorobenzoyl)glycinate	9	9	9	9	7	9	9	9	9	9	9	5
[3-Bromo-5-(p-chloro-phenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-(p-fluorobenzoyl)-beta-alaninate	9	9	9	6	-	0	-	9	9	7	6.5	3
[3-Bromo-5-(p-chloro-phenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-tertbutyl N-carboxy-2-(p-chlorophenyl)glycinate ester	9	9	6	9	9	0	0	9	9	0	9	4

TABLE I (Continued)

Compound	Armyworm			OP-Resistant Mites		Leaf hopper		Tobacco Budworm			Southern Corn Rootworm	
	(ppm)			(ppm)		(ppm)		(ppm)			(kg/ha)	
	1000	100	10	300	100	100	10	1000	100	10	50	10
[3-Bromo-5-(p-chloro-phenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-(p-chloro-benzoyl)glycinate	9	9	9	2	-	6.5	0	9	9	9	0	-
[3-Chloro-5-(p-chloro-phenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-benzoyl-glycinate	9	9	9	5	-	9	9	9	9	9	8.5	3
[3-Chloro-5-(p-chloro-phenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-acetyl-glycinate	9	9	9	9	9	5	0	9	9	8	9	8
[3-Chloro-5-(p-chloro-phenyl)-4-cyano-5-(trifluoromethyl)pyrrol-1-yl]methyl N-(trifluoroacetyl)-beta-alaninate	9	9	9	0	9	0	0	9	9	0	9	6

TABLE I (Continued)

<u>Compound</u>	<u>Armyworm</u>			<u>OP-Resistant</u>		<u>Leaf</u>		<u>Tobacco</u>			<u>Southern</u>	
	<u>(ppm)</u>			<u>Mites</u>		<u>hopper</u>		<u>Budworm</u>			<u>Corn</u>	
	<u>1000</u>	<u>100</u>	<u>10</u>	<u>300</u>	<u>100</u>	<u>100</u>	<u>10</u>	<u>1000</u>	<u>100</u>	<u>10</u>	<u>Rootworm</u>	<u>(kg/ha)</u>
[3-Chloro-5-(p-chloro-phenyl)-4-cyano-2-(tri-fluoromethyl)pyrrol-1-yl]methyl ethyl (carboxymethyl)methyloxamate ester	9	9	9	0	5	9	8.5	9	9	9	8.5	6
[2,3-Dichloro-4-cyano-5-(3,4-dichlorophenyl)-pyrrol-1-yl]methyl N-(p-chlorobenzoyl)glycinate	9	9	9	0	-	2.5	0	9	9	0	3.5	0
[3-Chloro-5-(p-chloro-phenyl)-4-cyano-2-(tri-fluoromethyl)pyrrol-1-yl]methyl N-(phenyl-sulfonyl)glycinate	9	9	9	7	9	6	-	9	9	4	0	-
[3-Chloro-5-(p-chloro-phenyl)-4-cyano-2-(tri-fluoromethyl)pyrrol-1-yl]methyl N-[(p-chloro-phenyl)sulfonyl]-2-isopropylglycinate	9	9	0	0	-	0	-	9	9	0	0	-

TABLE I (Continued)

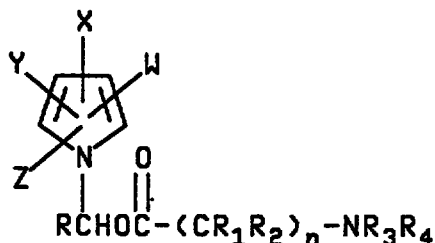
Compound	Armyworm			QP-Resistant Mites		Leaf hopper		Tobacco Budworm			Southern Corn Rootworm	
	(ppm)			(ppm)		(ppm)		(ppm)			(kg/ha)	
	<u>1000</u>	<u>100</u>	<u>10</u>	<u>300</u>	<u>100</u>	<u>100</u>	<u>10</u>	<u>1000</u>	<u>100</u>	<u>10</u>	<u>50</u>	<u>10</u>
[3-Chloro-5-(p-chloro-phenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-(trifluoroacetyl)glycinate	9	9	9	9	8	9	9	-	9	0	9	2
{2,3-Dibromo-5-(p-chloro-phenyl)-4-[(trifluoromethyl)sulfonyl]pyrrol-1-yl}methyl N-(p-chlorobenzoyl)glycinate	9	9	1	9	0	0	0	9	9	0	3.5	0
[3-Chloro-5-(p-chloro-phenyl)-4-cyano-5-(trifluoromethyl)pyrrol-1-yl]methyl N-(N-benzoyl-glycyl)glycinate	9	-	-	0	-	-	-	-	-	-	8	-
[3-Chloro-5-(p-chloro-phenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-benzyl N-carboxyglycinate ester	9	-	-	0	-	-	-	-	-	-	9	-



- 30 -

WE CLAIM:

1. A compound characterized by the structural formula



wherein

- $$\begin{array}{c} \text{S} \\ || \\ \text{S}(\text{O})_m\text{CF}_2\text{R}_5 \end{array}$$
- W is CN, NO₂, $\text{S}(\text{O})_m\text{CF}_2\text{R}_5$ or CNR₆R₇;
R₅ is hydrogen, F, Cl, Br, CF₂H, CCl₂H, CClFH, CF₃ or CCl₃;
m is an integer of 0, 1 or 2;
R₆ and R₇ are each independently hydrogen, C₁-C₄ alkyl optionally substituted with one or more halogen atoms, or phenyl optionally substituted with one or more halogen atoms, NO₂ groups, CN groups, C₁-C₄ alkyl groups optionally substituted with one or more halogen atoms, or C₁-C₄ alkoxy groups optionally substituted with one or more halogen atoms;
X is halogen, CF₃, CN, NO₂, $\text{S}(\text{O})_m\text{CF}_2\text{R}_5$ or phenyl optionally substituted with one or more halogen atoms, NO₂ groups, CN groups, C₁-C₄ alkyl groups optionally substituted with one or more halogen atoms, or C₁-C₄ alkoxy groups optionally substituted



with one or more halogen atoms;

Y is halogen, CF_3 or

phenyl optionally substituted with one or more
halogen atoms,

NO_2 groups,

CN groups,

$\text{C}_1\text{-C}_4$ alkyl groups optionally substituted
with one or more halogen atoms, or

$\text{C}_1\text{-C}_4$ alkoxy groups optionally substituted
with one or more halogen atoms;

Z is hydrogen, halogen or CF_3 ;

R is hydrogen or $\text{C}_1\text{-C}_4$ alkyl;

R_1 and R_2 are each independently hydrogen,

$\text{C}_1\text{-C}_6$ alkyl optionally substituted with
one or more halogen atoms,

$\text{C}_1\text{-C}_6$ alkoxy optionally substituted with
one or more halogen atoms, or

phenyl optionally substituted with one or
more halogen atoms,

NO_2 groups,

CN groups,

$\text{C}_1\text{-C}_4$ alkyl groups optionally sub-
stituted with one or more halogen
atoms, or

$\text{C}_1\text{-C}_4$ alkoxy groups optionally sub-
stituted with one or more halogen
atoms, or

when R_1 and R_2 are taken together with the atom to
which they are attached may form a $\text{C}_3\text{-C}_6$ cyclo-
alkyl group optionally substituted with one to
three $\text{C}_1\text{-C}_4$ alkyl groups, $\text{C}_2\text{-C}_6$ alkenyl groups or
phenyl groups, or

R_1 or R_2 may be taken together with R_3 and the
atoms to which they are attached to form a 4- to
7-membered heterocyclic ring;



n is an integer of 1, 2, 3 or 4;

R₃ is hydrogen,

C₁-C₆ alkyl,
C₂-C₆ alkenyl,
C₂-C₆ alkynyl, or
phenyl optionally substituted with one or more
halogen atoms,
NO₂ groups,
CN groups,
C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or
C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms, or

R₃ may be taken together with either R₁ or R₂ and
the atoms to which they are attached to form a 4-
to 7-membered heterocyclic ring;

R₄ is hydrogen,

C₁-C₆ alkyl,
C₂-C₆ alkenyl,
C₂-C₆ alkynyl,
phenyl optionally substituted with one or more
halogen atoms,
NO₂ groups,
CN groups,
C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or
C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms,

C(A)R₈,

C(A)R₉,

CN,

SO₂R₁₀, or

C(O)CHR₁₁NHR₁₂;

A is O or S;

R₈ is C₁-C₆ alkyl optionally substituted with one to



three halogen atoms,
 C_2-C_6 alkenyl,
 C_2-C_6 alkynyl, or
phenyl optionally substituted with one or more
halogen atoms,
 NO_2 groups,
CN groups,
 C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or
 C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms;
 R_9 is OR_{13} , CO_2R_{13} or $NR_{14}R_{15}$;
 R_{13} is C_1-C_6 alkyl optionally substituted with one
phenyl group, or
phenyl optionally substituted with one or more
halogen atoms,
 NO_2 groups,
CN groups,
 C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or
 C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms;
 R_{14} and R_{15} are each independently hydrogen or C_1-C_4
alkyl;
 R_{10} is $NR_{14}R_{15}$,
 C_1-C_6 alkyl,
 C_2-C_6 alkenyl,
 C_2-C_6 alkynyl, or
phenyl optionally substituted with one or more
halogen atoms,
 NO_2 groups,
CN groups,
 C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or
 C_1-C_4 alkoxy groups optionally substituted



with one or more halogen atoms;

R_{11} is hydrogen,

C_1-C_4 alkyl optionally substituted with

one hydroxy group,

one SR_{16} group,

one $C(O)NH_2$ group,

one NH_2 group,

one $NHC(=NH)NH_2$ group,

one CO_2H group,

one phenyl group optionally substituted with

one hydroxy group,

one 3-indolyl group or

one 4-imidazolyl group;

R_{16} is hydrogen or C_1-C_4 alkyl;

R_{12} is $C(A)R_{17}$; and

R_{17} is C_1-C_6 alkyl optionally substituted with one or more halogen atoms,

C_1-C_6 alkoxyalkyl,

C_1-C_6 alkylthio,

phenyl optionally substituted with one or more halogen atoms,

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted with one or more halogen atoms,

OR R_{13} ,

$NR_{14}R_{15}$, or

CO_2R_{13} .



2. The compound according to claim 1
wherein

S
||

W is CN, NO₂, S(O)_mCF₂R₅ or CNR₆R₇;
R₅ is hydrogen, F, Cl, Br, CF₂H, CCl₂H, CClFH, CF₃ or
CCl₃;
m is an integer of 0, 1 or 2;
R₆ and R₇ are each independently hydrogen or C₁-C₄
alkyl;
X is Cl, Br, CF₃ or
phenyl optionally substituted with one or more
halogen atoms,
NO₂ groups,
CN groups,
C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or
C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;
Y is Cl, Br, CF₃ or
phenyl optionally substituted with one or more
halogen atoms,
NO₂ groups,
CN groups,
C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or
C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;
Z is Cl, Br or CF₃;
R is hydrogen;
R₁ and R₂ are each independently hydrogen,
C₁-C₆ alkyl optionally substituted with one
or more halogen atoms, or
phenyl optionally substituted with one or more
halogen atoms,
NO₂ groups,



CN groups,

C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms;

n is an integer of 1 or 2;

R_3 is hydrogen or C_1-C_6 alkyl;

R_4 is $C(A)R_8$, $C(A)R_9$, SO_2R_{10} or $C(O)CHR_{11}NHR_{12}$;

A is O;

R_8 is C_1-C_6 alkyl optionally substituted with one to
three halogen atoms, or

phenyl optionally substituted with one or more
halogen atoms,

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms;

R_9 is OR_{13} or CO_2R_{13} ;

R_{13} is C_1-C_6 alkyl optionally substituted with one
phenyl group or one to three halogen atoms,
or

phenyl optionally substituted with one or more
halogen atoms,

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms;

R_{10} is C_1-C_6 alkyl, or

phenyl optionally substituted with one or more
halogen atoms,

NO_2 groups,



CN groups,

C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;

R₁₁ is hydrogen or C₁-C₄ alkyl;

R₁₂ is C(A)R₁₇; and

R₁₇ is C₁-C₆ alkyl optionally substituted with one or
more halogen atoms, or

phenyl optionally substituted with one or more
halogen atoms,

NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms.

3. The compound according to claim 2

wherein

W is CN or S(O)_mCF₃;

m is an integer of 0, 1 or 2;

X is phenyl optionally substituted with one or more
halogen atoms,

NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;

Y is Cl or Br;

Z is Cl, Br or CF₃;

R is hydrogen;

R₁ and R₂ are each independently hydrogen,

C₁-C₆ alkyl optionally substituted with one



- 38 -

or more halogen atoms, or
phenyl optionally substituted with one or
more halogen atoms,
NO₂ groups,
CN groups,
C₁-C₄ alkyl groups optionally substi-
tuted with one or more halogen
atoms, or
C₁-C₄ alkoxy groups optionally sub-
stituted with one or more halogen
atoms;

n is an integer of 1 or 2;

R₃ is hydrogen or C₁-C₆ alkyl;

R₄ is C(A)R₈, C(A)R₉, SO₂R₁₀ or C(O)CHR₁₁NHR₁₂;

A is O;

R₈ is C₁-C₆ alkyl optionally substituted with one to
three halogen atoms, or

phenyl optionally substituted with one or more
halogen atoms,

NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;

R₉ is OR₁₃ or CO₂R₁₃;

R₁₃ is C₁-C₆ alkyl optionally substituted with one
phenyl group or one to three halogen atoms;

R₁₀ is phenyl optionally substituted with one or more
halogen atoms,

NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted



- 39 -

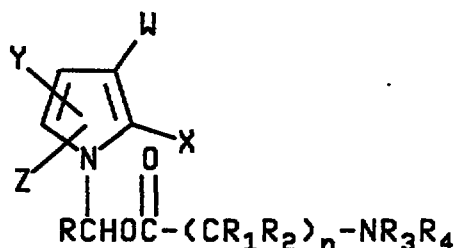
with one or more halogen atoms;

R_{11} is hydrogen;

R_{12} is $C(A)R_{17}$; and

R_{17} is phenyl optionally substituted with one or more halogen atoms,
 NO_2 groups,
 CN groups,
 C_1-C_4 alkyl groups optionally substituted with one or more halogen atoms, or
 C_1-C_4 alkoxy groups optionally substituted with one or more halogen atoms.

4. The compound according to claim 3 wherein the compound has the structural formula



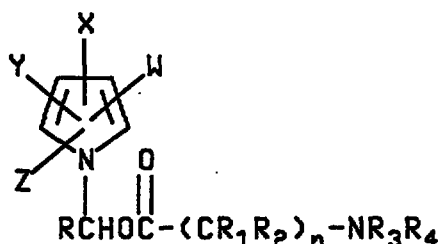
5. The compound selected from the group consisting of [3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-(p-chlorobenzoyl)glycinate;
 [3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl ethyl (carboxymethyl)methyloxamate ester;
 [3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-acetylglycinate;
 [3-bromo-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-(p-fluorobenzoyl)beta-alaninate;
 [3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-benzoylglycinate;
 [3-bromo-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)



- 40 -

pyrrol-1-yl]methyl N-(p-chlorobenzoyl)glycinate; and
[3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoro-
methyl)pyrrol-1-yl]methyl N-(phenylsulfonyl)glycinate.

6. A method for controlling insects,
acarina and mollusks which is characterized by contact-
ing said insects, acarina and mollusks, their breeding
grounds, food supply or habitat with an insecticidally,
acaricidally and molluscicidally effective amount of a
compound having the structural formula



wherein

W is CN, NO₂, S(=O)_mCF₂R₅ or CNR₆R₇;
R₅ is hydrogen, F, Cl, Br, CF₂H, CCl₂H, CClFH, CF₃ or
CCl₃;
m is an integer of 0, 1 or 2;
R₆ and R₇ are each independently hydrogen,
C₁-C₄ alkyl optionally substituted with one or
more halogen atoms, or
phenyl optionally substituted with one or more
halogen atoms,
NO₂ groups,
CN groups,
C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or
C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;
X is halogen, CF₃, CN, NO₂, S(=O)_mCF₂R₅ or
phenyl optionally substituted with one or more



- 41 -

halogen atoms,

NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;

Y is halogen, CF₃ or

phenyl optionally substituted with one or more
halogen atoms,

NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or

C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;

Z is hydrogen, halogen or CF₃;

R is hydrogen or C₁-C₄ alkyl;

R₁ and R₂ are each independently hydrogen,

C₁-C₆ alkyl optionally substituted with
one or more halogen atoms,

C₁-C₆ alkoxy optionally substituted with
one or more halogen atoms, or

phenyl optionally substituted with one or
more halogen atoms,

NO₂ groups,

CN groups,

C₁-C₄ alkyl groups optionally sub-
stituted with one or more halogen
atoms, or

C₁-C₄ alkoxy groups optionally sub-
stituted with one or more halogen
atoms, or

when R₁ and R₂ are taken together with the atom to
which they are attached may form a C₃-C₆ cyclo-



- 42 -

alkyl group optionally substituted with one to three C_1-C_4 alkyl groups, C_2-C_6 alkenyl groups or phenyl groups, or

R_1 or R_2 may be taken together with R_3 and the atoms to which they are attached to form a 4- to 7-membered heterocyclic ring;

n is an integer of 1, 2, 3 or 4;

R_3 is hydrogen,

C_1-C_6 alkyl,

C_2-C_6 alkenyl,

C_2-C_6 alkynyl, or

phenyl optionally substituted with one or more halogen atoms,

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted with one or more halogen atoms, or

R_3 may be taken together with either R_1 or R_2 and the atoms to which they are attached to form a 4- to 7-membered heterocyclic ring;

R_4 is hydrogen,

C_1-C_6 alkyl,

C_2-C_6 alkenyl,

C_2-C_6 alkynyl,

phenyl optionally substituted with one or more halogen atoms,

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted with one or more halogen atoms,

$C(A)R_8$,



- 43 -

$C(A)R_9$,

CN,

SO_2R_{10} , or

$C(O)CHR_{11}NHR_{12}$;

A is O or S;

R_8 is C_1-C_6 alkyl optionally substituted with one to three halogen atoms,

C_2-C_6 alkenyl,

C_2-C_6 alkynyl, or

phenyl optionally substituted with one or more halogen atoms,

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted with one or more halogen atoms;

R_9 is OR_{13} , CO_2R_{13} or $NR_{14}R_{15}$;

R_{13} is C_1-C_6 alkyl optionally substituted with one phenyl group, or

phenyl optionally substituted with one or more halogen atoms,

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted with one or more halogen atoms;

R_{14} and R_{15} are each independently hydrogen or C_1-C_4 alkyl;

R_{10} is $NR_{14}R_{15}$,

C_1-C_6 alkyl,

C_2-C_6 alkenyl,

C_2-C_6 alkynyl, or

phenyl optionally substituted with one or more



- 44 -

halogen atoms,
 NO_2 groups,
 CN groups,
 $\text{C}_1\text{-C}_4$ alkyl groups optionally substituted
 with one or more halogen atoms, or
 $\text{C}_1\text{-C}_4$ alkoxy groups optionally substituted
 with one or more halogen atoms;

R_{11} is hydrogen,
 $\text{C}_1\text{-C}_4$ alkyl optionally substituted with
 one hydroxy group,
 one SR_{16} group,
 one $\text{C}(\text{O})\text{NH}_2$ group,
 one NH_2 group,
 one $\text{NHC}(=\text{NH})\text{NH}_2$ group,
 one CO_2H group,
 one phenyl group optionally substituted with
 one hydroxy group,
 one 3-indolyl group or
 one 4-imidazolyl group;

R_{16} is hydrogen or $\text{C}_1\text{-C}_4$ alkyl;

R_{12} is $\text{C}(\text{A})\text{R}_{17}$; and

R_{17} is $\text{C}_1\text{-C}_6$ alkyl optionally substituted with one or
 more halogen atoms,

$\text{C}_1\text{-C}_6$ alkoxyalkyl,
 $\text{C}_1\text{-C}_6$ alkylthio,
 phenyl optionally substituted with one or more
 halogen atoms,
 NO_2 groups,
 CN groups,
 $\text{C}_1\text{-C}_4$ alkyl groups optionally substituted
 with one or more halogen atoms, or
 $\text{C}_1\text{-C}_4$ alkoxy groups optionally substituted
 with one or more halogen atoms,

OR_{13} ,

$\text{NR}_{14}\text{R}_{15}$, or

CO_2R_{13} .



- 45 -

7. The method according to claim 6

wherein

W is CN or $S(O)_mCF_3$;

m is an integer of 0, 1 or 2;

X is phenyl optionally substituted with one or more
halogen atoms,
 NO_2 groups,
CN groups,
 C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or
 C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms;

Y is Cl or Br;

Z is Cl, Br or CF_3 ;

R is hydrogen;

R_1 and R_2 are each independently hydrogen,
 C_1-C_6 alkyl optionally substituted with one
or more halogen atoms, or
phenyl optionally substituted with one or
more halogen atoms,
 NO_2 groups,
CN groups,
 C_1-C_4 alkyl groups optionally substi-
tuted with one or more halogen
atoms, or
 C_1-C_4 alkoxy groups optionally sub-
stituted with one or more halogen
atoms;

n is an integer of 1 or 2;

 R_3 is hydrogen or C_1-C_6 alkyl; R_4 is $C(A)R_8$, $C(A)R_9$, SO_2R_{10} or $C(O)CHR_{11}NHR_{12}$;

A is O;

R_8 is C_1-C_6 alkyl optionally substituted with one to
three halogen atoms, or



- 46 -

phenyl optionally substituted with one or more
halogen atoms,
NO₂ groups,
CN groups,
C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or
C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;

R₉ is OR₁₃ or CO₂R₁₃;

R₁₃ is C₁-C₆ alkyl optionally substituted with one
phenyl group or one to three halogen atoms;

R₁₀ is phenyl optionally substituted with one or more
halogen atoms,
NO₂ groups,
CN groups,
C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or
C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;

R₁₁ is hydrogen;

R₁₂ is C(A)R₁₇; and

R₁₇ is phenyl optionally substituted with one or more
halogen atoms,
NO₂ groups,
CN groups,
C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or
C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms.

8. The method according to claim 7 wherein the
compound is selected from the group consisting of
[3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoro-
methyl)pyrrol-1-yl]methyl N-(p-chlorobenzoyl)-
glycinate;



- 47 -

[3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl ethyl (carboxymethyl)-methyloxamate ester;

[3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-acetylglycinate;

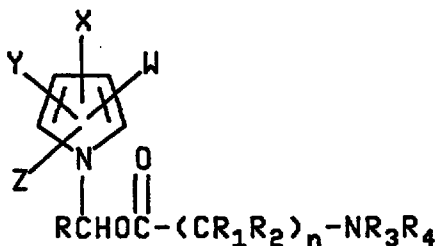
[3-bromo-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-(p-fluorobenzoyl)-beta-alaninate;

[3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-benzoylglycinate;

[3-bromo-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-(p-chlorobenzoyl)glycinate;

and [3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-(phenylsulfonyl)glycinate.

9. A method for protecting growing plants from attack by insects, acarina and mollusks which is characterized by applying to the foliage of said plants or to the soil or water in which they are growing an insect-icidally, acaricidally or molluscicidally effective amount of a compound having the structural formula



wherein W, X, Y, Z, R, R₁, R₂, R₃, R₄ and n are as described in claim 6.

10. The method according to claim 9

wherein

W is CN or S(O)_mCF₃;

m is an integer of 0, 1 or 2;



- 48 -

X is phenyl optionally substituted with one or more
halogen atoms,
NO₂ groups,
CN groups,
C₁-C₄ alkyl groups optionally substituted
with one or more halogen atoms, or
C₁-C₄ alkoxy groups optionally substituted
with one or more halogen atoms;

Y is Cl or Br;

Z is Cl, Br or CF₃;

R is hydrogen;

R₁ and R₂ are each independently hydrogen,
C₁-C₆ alkyl optionally substituted with one
or more halogen atoms, or
phenyl optionally substituted with one or
more halogen atoms,
NO₂ groups,
CN groups,
C₁-C₄ alkyl groups optionally substi-
tuted with one or more halogen
atoms, or
C₁-C₄ alkoxy groups optionally sub-
stituted with one or more halogen
atoms;

n is an integer of 1 or 2;

R₃ is hydrogen or C₁-C₆ alkyl;

R₄ is C(A)R₈, C(A)R₉, SO₂R₁₀ or C(O)CHR₁₁NHR₁₂;

A is O;

R₈ is C₁-C₆ alkyl optionally substituted with one to
three halogen atoms, or
phenyl optionally substituted with one or more
halogen atoms,
NO₂ groups,
CN groups,
C₁-C₄ alkyl groups optionally substituted



- 49 -

with one or more halogen atoms, or
 C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms;

R_9 is OR_{13} or CO_2R_{13} ;

R_{13} is C_1-C_6 alkyl optionally substituted with one
phenyl group or one to three halogen atoms;

R_{10} is phenyl optionally substituted with one or more
halogen atoms,

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms;

R_{11} is hydrogen;

R_{12} is $C(A)R_{17}$; and

R_{17} is phenyl optionally substituted with one or more
halogen atoms,

NO_2 groups,

CN groups,

C_1-C_4 alkyl groups optionally substituted
with one or more halogen atoms, or

C_1-C_4 alkoxy groups optionally substituted
with one or more halogen atoms.

11. The method according to claim 10 wherein the
compound is selected from the group consisting of
[3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoro-
methyl)pyrrol-1-yl]methyl N-(p-chlorobenzoyl)-
glycinate;

[3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoro-
methyl)pyrrol-1-yl]methyl ethyl (carboxymethyl)-
methyloxamate ester;

[3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoro-
methyl)pyrrol-1-yl]methyl N-acetylglycinate;



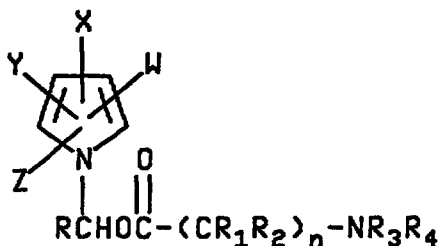
- 50 -

[3-bromo-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-(p-fluorobenzoyl)-beta-alaninate;

[3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-benzoylglycinate;

[3-bromo-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-(p-chlorobenzoyl)glycinate; and [3-chloro-5-(p-chlorophenyl)-4-cyano-2-(trifluoromethyl)pyrrol-1-yl]methyl N-(phenylsulfonyl)glycinate.

12. A composition for controlling insects, acarina and mollusks characterized by an agronomically acceptable carrier and an insecticidally, molluscicidally or acaricidally effective amount of a compound having the structural formula



wherein W, X, Y, Z, R, R₁, R₂, R₃, R₄ and n are as described in claim 1.