

# PYRIFLUQUINAZON

Insecticide



NIHON NOHYAKU CO., LTD.

# Chemical and Physical Properties

Common name (ISO) : Pyrfluquinazon

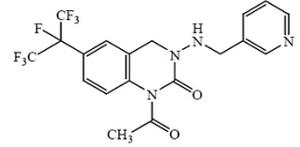
Chemical name(IUPAC) : 1-acetyl-1,2,3,4-tetrahydro-3-[(3-pyridylmethyl)amino]-6-[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]quinazolin-2-one

Water solubility : 12.1 mg/L (20°C)

Partition coefficient : Log Pow = 3.12 (25°C)

Formulation : 20% WG (w/w), 20%SC (w/w)

Structure formula



# Toxicology

## Mammalian toxicity

### Technical

### 20%SC

Acute oral LD <sub>50</sub> (Rat):	(male)	300-2000 mg/kg	(female)	2000 mg/kg
Acute dermal LD <sub>50</sub> (Rat):	(male, female)	> 2000 mg/kg	(male, female)	>2000 mg/kg
Eye irritation (Rabbit) :		Non irritant		Mildly irritant
Skin irritation (Rabbit):		Non irritant		Slightly irritant
Dermal sensitization:	(Guinea pig)	Mild	(LLNA* in Mice)	Positive

\*LLNA: Local lymph node assay

## Ecotoxicity

Carp, LC <sub>50</sub> (96hr) :	44 mg/L
Daphnia, EC <sub>50</sub> (48hr):	0.0027 mg/L

# Characteristics

## 1 New Mode of Action

- No Direct Killing
- Control insect behavior

## 2 Effective to Sucking Insects

Aphids, Whiteflies, Mealybugs, Scales, Thrips

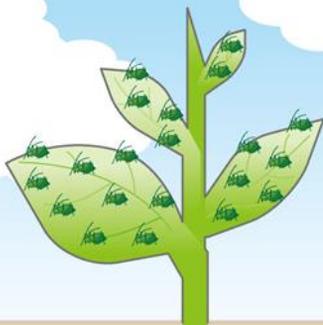
## 3 Safe for Natural Enemies

# IBR

## Insect Behavior Regulator

Stop sucking, walking and flight behavior quickly and leave it from the crop. In addition, by inhibiting fixing behavior, insects unable to infest, starved to death

Before Treatment



After Treatment

Can not suck then escape

Can not suck then fall down

- : Drop, Runout
- : Paralysis
- : Death

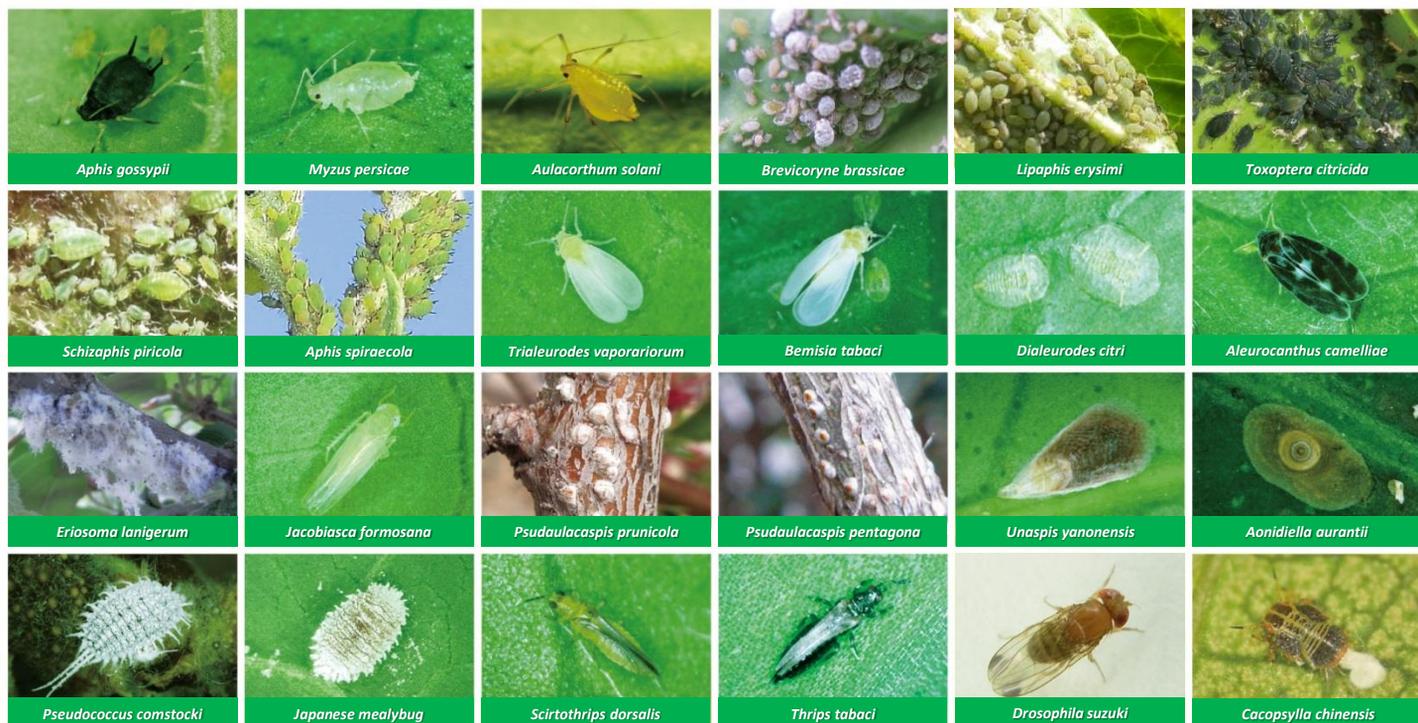
Pyrfluquinazon layer

# Control Spectrum

Pest insects		Activity*	
Hemiptera (Homoptera)	Aphididae	<i>Aphis gossypii</i>	E
		<i>Aphis spiraeicola</i>	E
		<i>Myzus persicae</i>	E
		<i>Aulacorthum solani</i>	E
		<i>Macrosiphum euphorbiae</i>	E
		<i>Hyalopterus pruni</i>	E – H
		<i>Phopalosiphum padi</i>	E
		<i>Schizaphis piricola</i>	E
		<i>Toxoptera citricida</i>	E
		<i>Myzus varians</i>	E
		<i>Rhopaloshiphum rufiabdominale</i>	E
		<i>Brevicoryne brassicae</i>	E – H
		<i>Brachycaudus helichrysi</i>	E
		<i>Sitobion ibarae</i>	E
	<i>Toxoptera citricida</i>	E	
	Aleyrodidae	<i>Trialeurodes vaporariorum</i>	E
		<i>Bemisia tabaci</i>	E
	Deltocephalidae	<i>Empoasca onukii</i>	H
	Flatidae	<i>Geisha distinctissima</i>	E
	Pseudococcidae	<i>Pseudococcus comstocki</i>	E
<i>Planococcus kraunhiae</i>		E	
<i>Planococcus citri</i>		H	
<i>Crisicoccus seruratus</i>		E	
Margarodidae	<i>Icerya purchasi</i>	H	

Pest insects		Activity	
Hemiptera (Homoptera)	Coccidae	<i>Ceroplastes rubens</i>	H
		<i>Ceroplastes japonicus</i>	H
	Diaspididae	<i>Aonidiella aurantii</i>	E – H
		<i>Comstockaspis pernicioso</i>	E – H
		<i>Pseudaulacaspis pentagona</i>	E
		<i>Pseudaulacaspis prunicola</i>	H
Pentatomidae	<i>Halyomorpha halys</i>	M	
	<i>Plautia crossota</i>	M	
Hemiptera	Miridae	<i>Trigonotylus caelestialium</i>	H
	Tingidae	<i>Stephanitis nashi</i>	M
Thysanoptera	Thripidae	<i>Scirtothrips dorsalis</i>	H
		<i>Thrips tabaci</i>	H – M
		<i>Thrips palmi</i>	W
		<i>Frankliniella occidentalis</i>	W
Diptera	Agromyzidae	<i>Liripmyza trifolii</i>	M – W
	Anthomyiidae	<i>Delia platura</i>	M – W
	Drosophila	<i>Drosophila suzukii</i>	H
Others	Lepidoptera	Noctuidae, Carposinidae, etc	W
	Coleoptera	Coccinellidae, Cerambycidae, etc	W
	Acarina	Tetranychidae	W
	Blattaria	<i>Periplaneta americana</i> , etc	M – W
	Orthoptera	<i>Oxya yezoensis</i>	M – W

\*Activity: E: excellent, H: High, M: Moderate, W: Weak

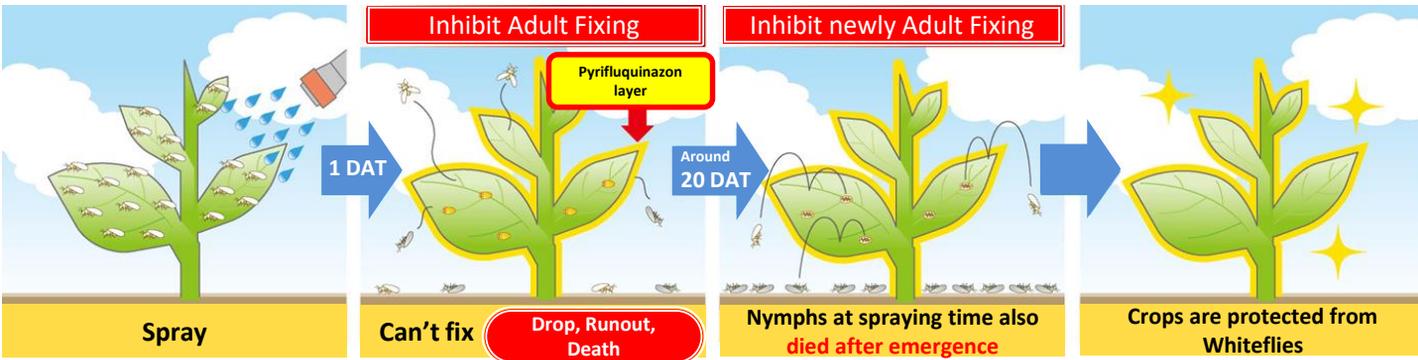


## Mode of Action

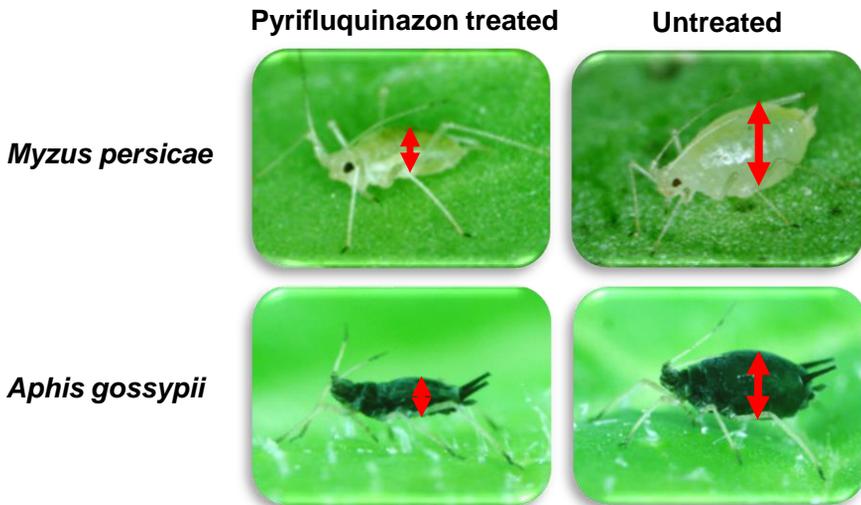
Classified Group 9, Chordotonal Organ TRPV Channel Modulators by IRAC\*

\*Insecticide Resistance Action Committee

Treated Whiteflies are away from crops, unable to suck and starved to death



## Symptom of Affected Aphids (48hrs after treatment)



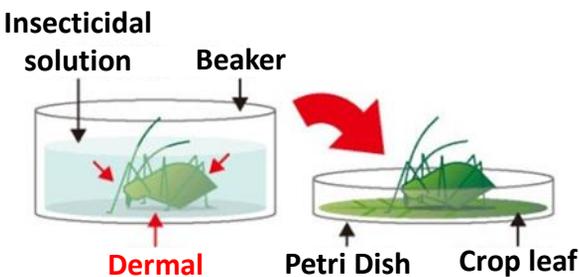
Treated Aphids are not able to suck, then those bodies are shrunk due to starvation



## Efficacy by Uptake Pathway

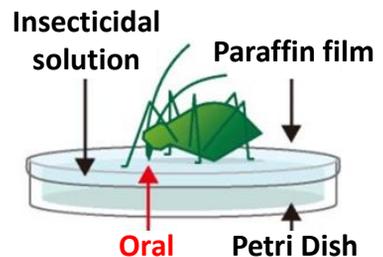
Shows high activity both Oral and Dermal intakes

### Insect Dipping method (Dermal activity)



EC<sub>50</sub>: 0.3 – 1 ppm

### Paraffin film method (Oral activity)



EC<sub>50</sub>: 0.01 – 0.1 ppm

## ■ Translaminar, Systemic Activity

Translaminar activity from upper side to backside of leaves has been confirmed  
 Systemic activity is weak → Spray coverage is important for good control

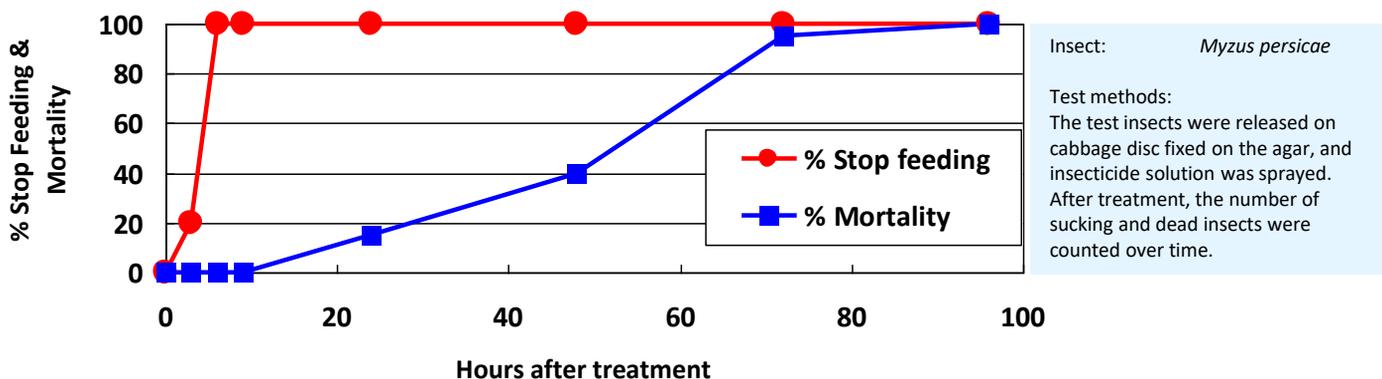
### Translaminar efficacy to Aphids on Cabbage, Cucumber and Eggplant

	Conc. (ppm)	Total No. of insects on underside & upper side						Insect Cabbage: <i>Brevicoryne brassicae</i> Cucumber: <i>Aphis gossypii</i> Eggplant: <i>Myzus persicae</i>  Test methods Insecticidal solution was applied to the upper of leaves that infested with aphid on backside of leaves.
		Cabbage		Cucumber		Eggplant		
		0 DAT*	7 DAT	0 DAT	7 DAT	0 DAT	7 DAT	
Pyrifluquinazon	50	28	0	24	0	32	0	
Untreated		21	136	14	98	19	68	

\*DAT: Days After Treatment

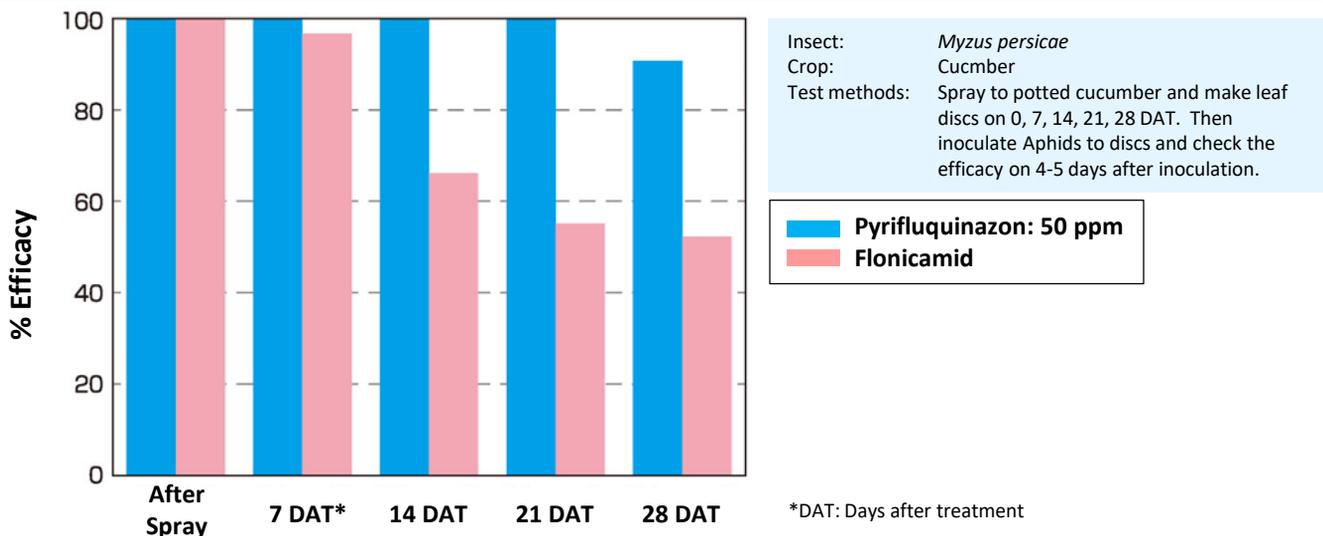
## ■ Speed of Action

Inhibition of feeding activity is fast, but it will take several days for pests to die



## ■ Long Lasting Efficacy

Good long lasting effect to Aphids



# Efficacy depending on Development Stage

Pests	Pyrifluquinazon (50 ppm) efficacy <sup>(1)</sup>				
	Egg	1 <sup>st</sup> instar <sup>(2)</sup>	After 2 <sup>nd</sup> instar		Adult
Aphids		+	+		+
Whitflies	-	+	- (4)		+
Mealybugs	-	+	+		+
Scales	-	+	- (4)		- (4)
Green Tea Leafhopper	- (3)	+	+		+
Yellow Tea Thrips	- (3)	+	+	Pupa: - (3)	+

(1): efficacy: +: mortality is more than 90%, -: less than 90%  
 (2): including crawler, (3): estimation, (4): fixing stage

### Aphids

1<sup>st</sup> Instar



+++ High efficacy

2<sup>nd</sup> - 3<sup>rd</sup> Instar



+++ High efficacy

Adult (female)



+++ High efficacy

### Whiteflies

Egg



- Poor efficacy

Crawler



+++ High efficacy

Fixed nymph (1<sup>st</sup> instar)



+ Moderate efficacy

Fixed nymph (4<sup>th</sup> instar)



- Poor efficacy

Adult



+++ High efficacy

### Mealybugs

Egg



- Poor efficacy

1<sup>st</sup> Instar



+++ High efficacy

2<sup>nd</sup> - 3<sup>rd</sup> Instar



+++ High efficacy

Adult (female)



+++ High efficacy

### Scales

Egg



- Poor efficacy

1<sup>st</sup> Instar (Non fix)



+++ High efficacy

Fixed 1<sup>st</sup> - Early 2<sup>nd</sup> instar



+ Moderate efficacy

Later 2<sup>nd</sup> - 3<sup>rd</sup> instar



- Poor efficacy

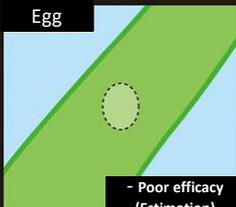
Adult (female)



- Poor efficacy

### Thrips

Egg



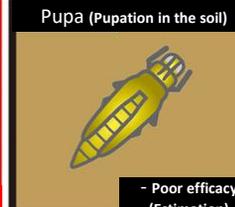
- Poor efficacy (Estimation)

1<sup>st</sup> - 2<sup>nd</sup> Instar



+++ High efficacy

Pupa (Pupation in the soil)



- Poor efficacy (Estimation)

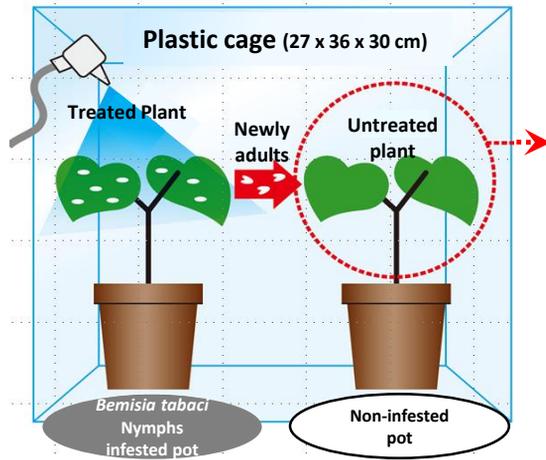
Adult



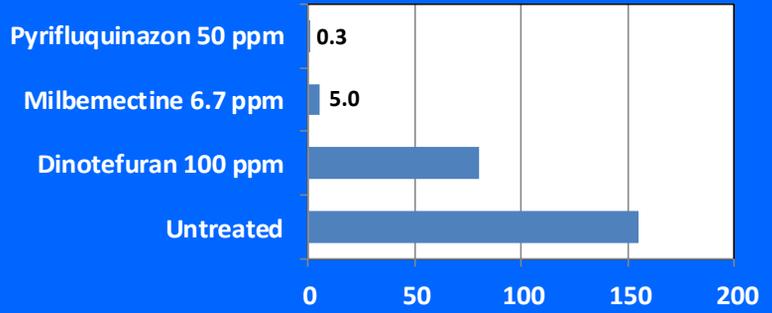
+++ High efficacy

## Efficacy to Fixed stage Whiteflies

Effects to Newly Adults by Spraying at Fixed Nymphs stage of *Bemisia tabaci*



No. of Adults from Treated to Untreated Plant at 12–13 DAT



Insect: *Bemisia tabaci*, Biotype Q

Crop: Kidney bean, ver.: Top crop

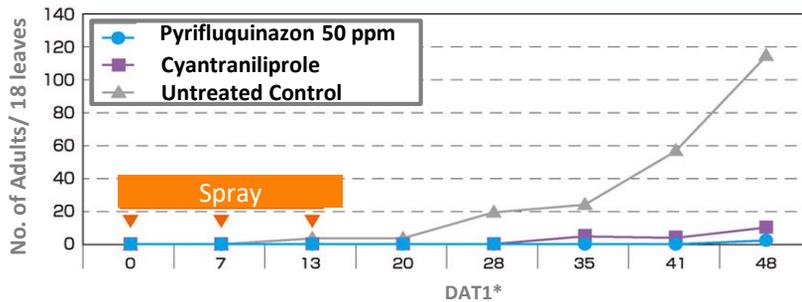
Methods: Potted crop was placed in a cage and inoculated 30 WF adults and keep 20 days. After that insecticidal solution was sprayed. After air-drying, treated pot was placed in the cage with untreated plant

Assessment: No. of adults on untreated plant was counted at 12-13 DAT.

Suppress dispersion to untreated leaves even though spray time is fixed nymph stage

## Suppress the Virus Transmission

Suppressive effect of viral disease caused by *Bemisia tabaci*



Crop: Tomato

Ver. Rinka409

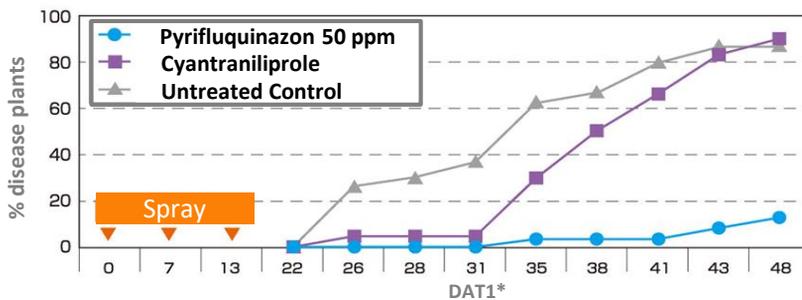
Plot: 8 plants/plot

3 replications

Assessment

For WF: At each 6 plants, one leaf was selected from upper, middle and lower part. And No. of adults was counted.

For disease: All plants was checked



Suppress virus disease for a long time by spraying at beginning of infestation

\*DAT1: Days After 1<sup>st</sup> Treatment

## Sucking Inhibition to Aphids

	Conc. (ppm)	No. of Dead	No. of Drop + Abnormal	Absorbance*	% Sucking Control
Pyrifluquinazon	50	0	8	0.012	97
Imidacloprid	50	10	0	0.014	97
Cyhalothrin	25	10	0	0.017	96
Acephate (Granule)	500	5	5	0.091	81
Untreated	-	0	0	0.473	0

Insect: *Myzus persicae*

Crop: Chinese cabbage leaf disc

Methods: Aphids were inoculated on leaf discs fixed on agar and insecticidal solution was sprayed. After air dried, the disc was covered with a petri dish and turned upside down and keep at 25 degrees. 1DAT, the petri dish was removed and washed with water. After filtering, amino acid concentration of the filtrate was measured by the Moore-Stein method (\*Absorbance measured at 530 nm)

Good sucking inhibition same as Pyrethroids and Neonicotinoids



**NIHON NOHYAKU CO., LTD.**

19-8, KYOBASHI 1-CHOME, CHUO-KU, TOKYO, JAPAN