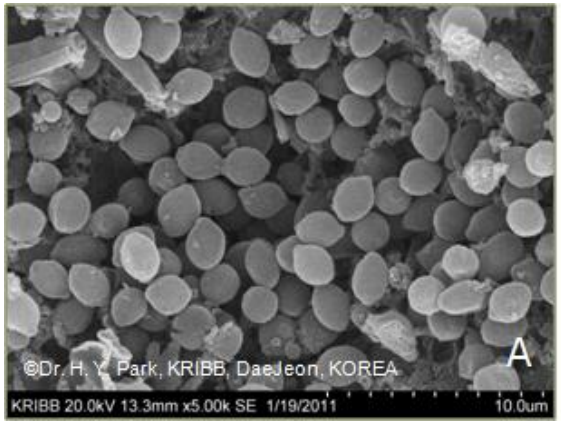
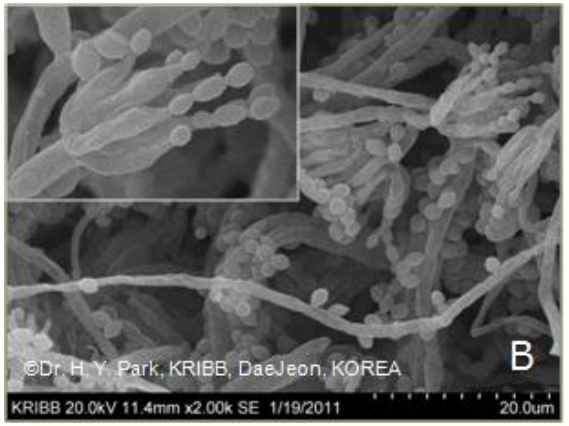
PaeciPora

Organic Biological Pesticide





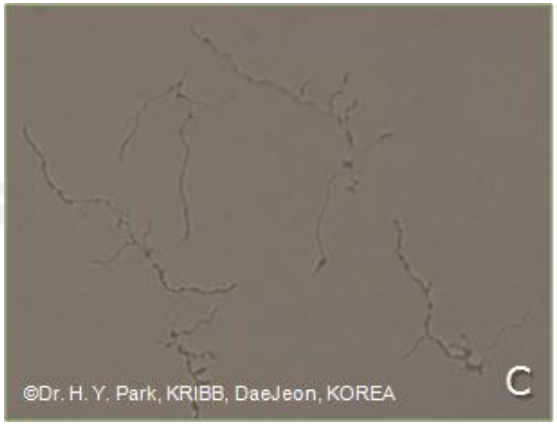


Photo A : Harvested spores of PaeciPora

Photo B : Sporulation of PaeciPora

Photo C : Germinating spores of PaeciPora

Research Develop 한국생명공학연구원 Korea Research Institute of Bioscience and Biotechnology

Manufacture Insect Biotech Co., Ltd.

Background

(a) Some of those insects harm to various major crops, plants and animals. Chemical insecticides have been used to control such pests. But such chemical insecticides have killed not only pests but also useful insects and parasites living in pests because of their wide spectrum. In addition, target pests cannot be controlled anymore by having resistance against chemical insecticides owing to the repeated exposure on them. Further, chemical insecticides are harmful for human body.

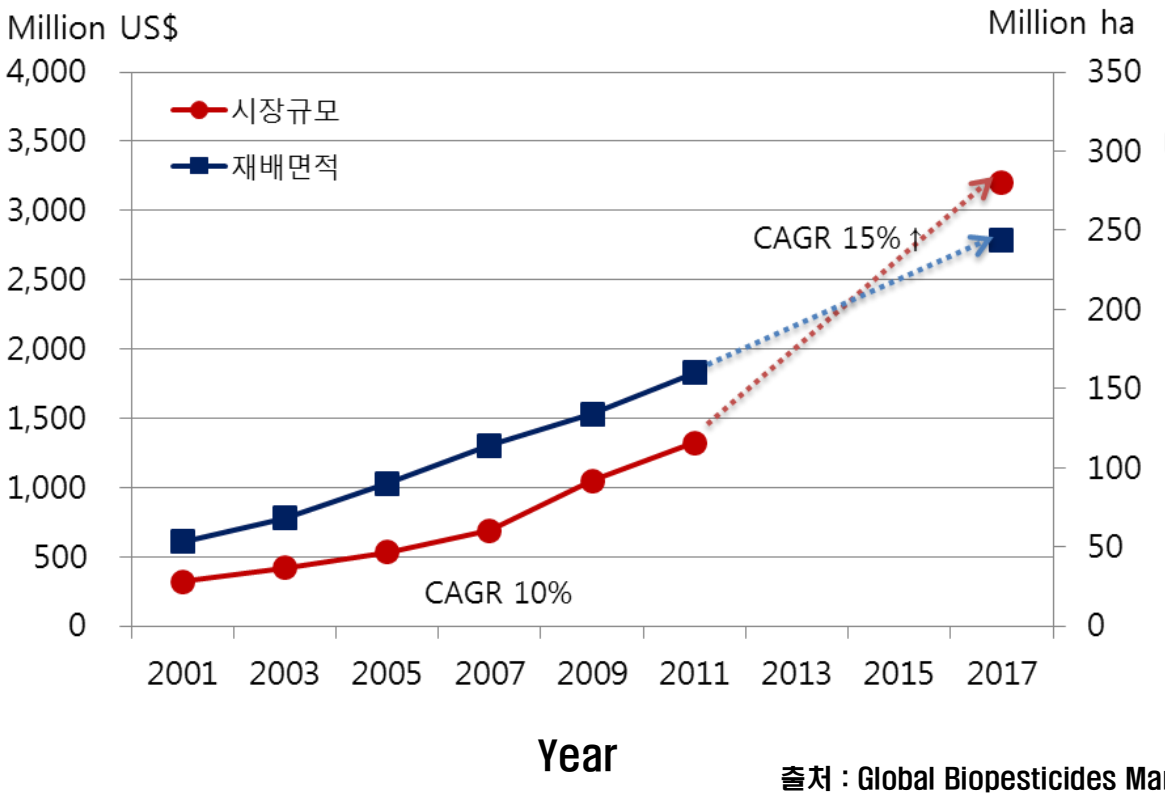
(b) As one way of environment-friendly controlling method for pets(insects), insect pathogenic microorganisms are now being used, which is characterized by working selectively for target pests only without harming human, animals and plants.

(c) Research and development Pacipora (insect pathogenic microorganisms) for controlling soil pests harming major crops.

Who used biopesticide?

- Conventional farmers
  - Resistance management tools
- Organic farmers
  - Pest and disease management inputs
- Urban homeowners and gardeners
  - Reduce hazard exposure to children and pets
- Government agencies
  - Pest mitigation

Global Biopesticide Market Share



출처 : Global Biopesticides Market (Trends & Forecasts)

Biopesticide Market

- 468 million US$(2003), 672 million US$(2005), 1,320 million US$(2011), CAGR 10%
- Forecast CAGR 15% (2017)

PaeciPora ?

- **Non chemical pesticide, Organic Biopesticide**
- ***Paecilomyces lilacinus* HY-4 Spore formulation**

High viable spores(8.6 X 10^9 cfu/g), Wettable powder, Emulsifieble concentrate

- **Insecticidal efficacy for mite, whitefly, aphid**

Compatibility Test – Chemical insecticide

Active ingredient	Formulation	Chemical class	RC (ppm)[1]	Inhibition rate[2] (%)			Germination rate (%)			Sporulation[3]		
				RC	0.2×RC	0.1×RC	RC	0.2×RC	0.1×RC	RC	0.2×RC	0.1×RC
Abamectin	EC[4] 1.8%	Glycoside	6	18.8	0	0	>95	>95	>95	++	++	++
Chlorfenapyr	SC 10%	Pyrrole	50	3.1	0	0	>95	>95	>95	++	++	++
Chlorpyrifos	WG 72%	Organophosphate	288	51.6	7.8	1.6	85.2	>95	>95	++	++	++
Dinotefuran	WP 10%	Neonicotinoid	100	28.1	4.7	1.1	82.4	>95	>95	++	++	++
Etofenprox	EW 10%	Pyrethroid	100	9.5	1.5	0	>95	>95	>95	++	++	++
Imidacloprid	WP 10%	Neonicotinoid	50	9.8	3.1	0	>95	>95	>95	++	++	++
Indoxacarb	SC 5%	Oxadiazine	50	25.0	1.7	0	>95	>95	>95	++	++	++
Methoxyfenozide	SC 21%	Diacylhydrazine	105	14.1	0.9	0	>95	>95	>95	+	++	++
Spinosad	SC 10%	Spinosyn	50	29.7	1.4	0.6	>95	>95	>95	++	++	++

[1] RC– recommended concentration (field recommended ppm of technical grade).
[2] Inhibitory rate=[(colony diameter of control – colony diameter of treated group)/(colony diameter of control)] ×100%
[3] Sporulation: (++), normal sporulation; (+), poor sporulation.
[4] EC– emulsifiable concentrate; SC– suspension concentrate; WG– water dispersible granule; WP–wettable powder; EW– emulsion in water.

Compatibility Test – Chemical fungicide

Active ingredient	Formulation	Chemical class	RC (ppm)[1]	Inhibition rate[2] (%)			Germination rate (%)			Sporulation[3]		
				RC	0.2×RC	0.1×RC	RC	0.2×RC	0.1×RC	RC	0.2×RC	0.1×RC
Benomyl	WP[4] 50%	Benzimidazole	350	100.0	100.0	100.0	0	0	29.1	-	-	-
Chlorothalonil	WP 75%	Chloronitrile	1275	100.0	100.0	100.0	0	0	0	-	-	-
Dimethomorph	WP 25%	Cinnamic Acid Amide	250	45.3	15.6	4.7	81.6	>95	>95	++	++	++
Fenarimol	EC 12.5%	Pyrimidine	41	90.6	82.8	57.8	9.4	24.2	84.7	-	-	-
Fludioxonil	FU 20%	Phenylpyrrole	40	67.2	60.9	59.4	22.5	27.1	32.7	-	-	-
Hymexazol	SL 30%	Isoxazole	300	56.3	56.3	60.7	>95	>95	>95	+	+	+
Mancozeb	WP 75%	Ethylene bisdithiocarbamate	1275	100.0	70.3	18.8	0	24.5	81.4	-	+	+
Polyoxin B	SP 75%	Polyoxin	100	0	0	0	>95	>95	>95	+	++	++
Tebuconazole	EC 25%	Triazole	125	100.0	100.0	93.8	0	0	0	-	-	-
Tetraconazole	EC 12%	Triazole	60	89.1	82.8	53.1	54.7	62.1	75.5	-	-	+
Thiophanate-methyl	WP 70%	Carbamate	700	100.0	100.0	100.0	0	0	0	-	-	-

[1] RC– recommended concentration (field recommended ppm of technical grade).
[2] Inhibitory rate=[(colony diameter of control – colony diameter of treated group)/(colony diameter of control)] ×100%
[3] Sporulation: (++), normal sporulation; (+), poor sporulation; (–), no sporulation.
[4] WP– wettable powder; EC– emulsifiable concentrate; FU– fumigant; SL– soluble concentrate; SP– water soluble powder.

Compatibility Test – Chemical herbicide

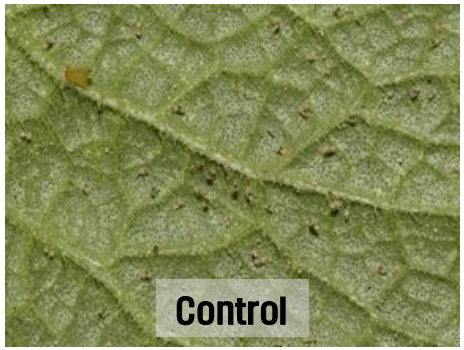
Active ingredient	Formulation	Chemical class	RC (ppm)[1]	Inhibition rate[2] (%)			Germination rate (%)			Sporulation[3]		
				RC	0.2×RC	0.1×RC	RC	0.2×RC	0.1×RC	RC	0.2×RC	0.1×RC
Alachlor	EC[4] 43.7%	Acetanilide	1093	82.8	76.6	51.6	35.9	36.8	80.7	-	++	++
Butachlor	EC 58.8%	Chloroacetamide	1470	78.1	48.4	37.5	58.6	>95	>95	++	++	++
Glyphosate	SL 41.0%	Glycine	2050	29.7	12.5	9.4	>95	>95	>95	++	++	++
Napropamide	WP 50.0%	Acetamide	1250	100.0	87.5	60.9	0	15.2	77.5	-	+	++
S-metolachlor	EC 25.0%	Chloroacetamide	750	78.1	51.6	31.3	24.3	67.5	82.2	+	++	++

[1] RC– recommended concentration (field recommended ppm of technical grade).
[2] Inhibitory rate=[(colony diameter of control – colony diameter of treated group)/(colony diameter of control)] × 100%
[3] Sporulation: (++), normal sporulation; (+), poor sporulation; (–), no sporulation.
[4] EC– emulsifiable concentrate; SL– soluble concentrate; WP– wettable powder.

PaeciPora – Control Efficiency

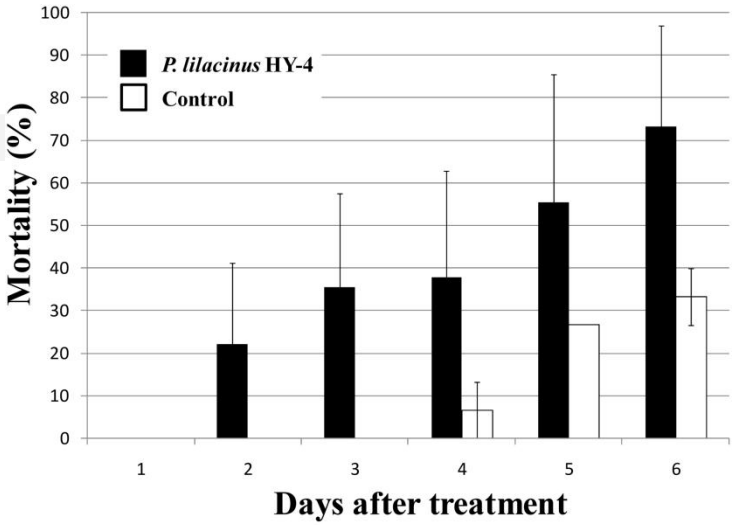
Control efficiency of PaeciPora® and azocyclotin on *T. urticae*

Active ingredients	Mortality (%)		Injury level (0~9)	
	After 3days	After 7days	After 3days	After 7days
PaeciPora®	56.0	63.6	0	0
Azocyclotin	91.9	93.2	0	0

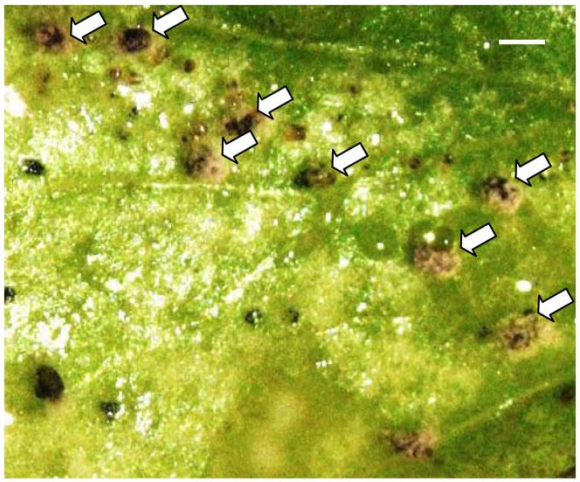


Treatment : A final concentration of $1X10^7$ conidia/ml was used for foliar application at the seeding stage of cucumber. Data was recorded on day 7 after spraying.

PaeciPora – Control Efficiency



(a)



(b)

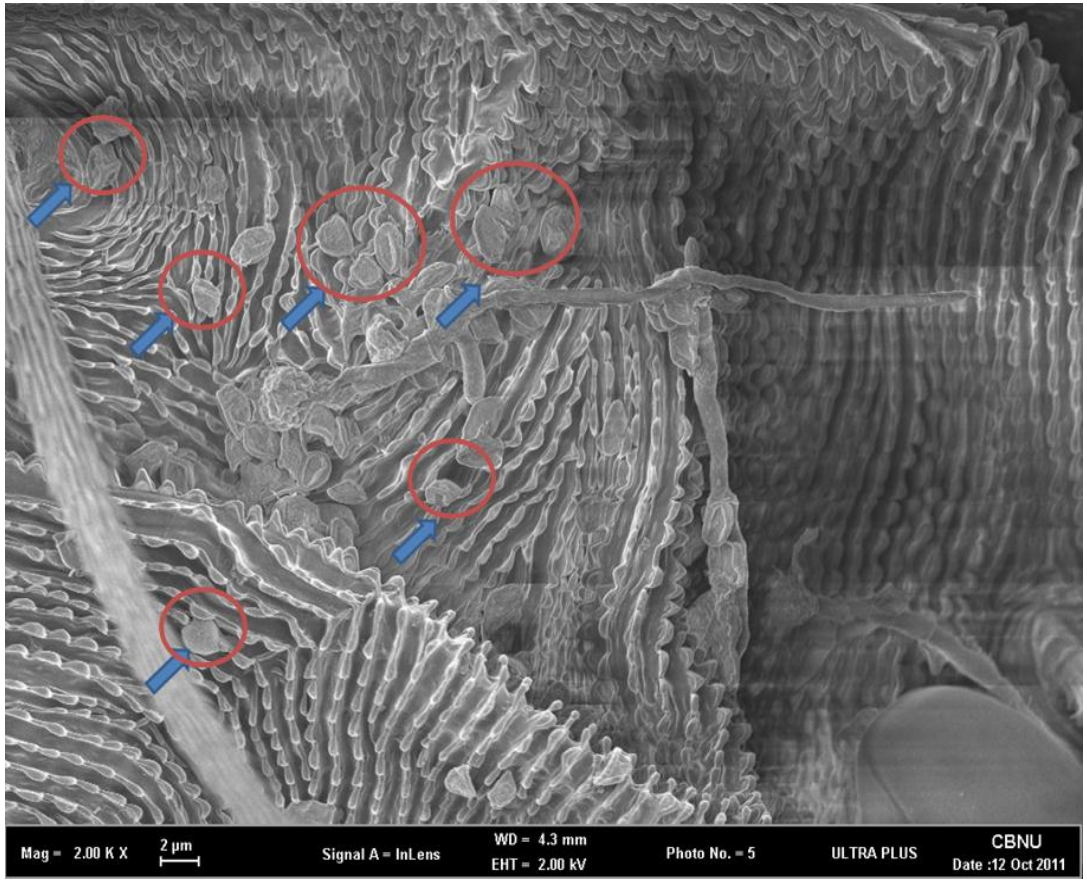
(a) The mean mortality of two-spotted spider mite adults during 6 days after treatment 4.4 X 10^5 conidia of Paecipora in 0.05% Tween-80.

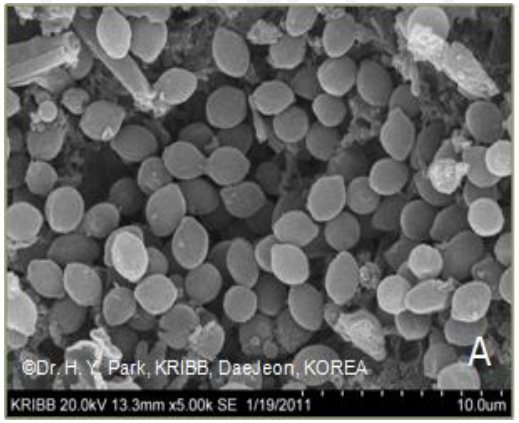
(b) Spider mite adults infected with Paecipora at 2 days after death. Arrows indicate infected mites. Scale bars: (b) 0.5 mm. (Online figure in color)

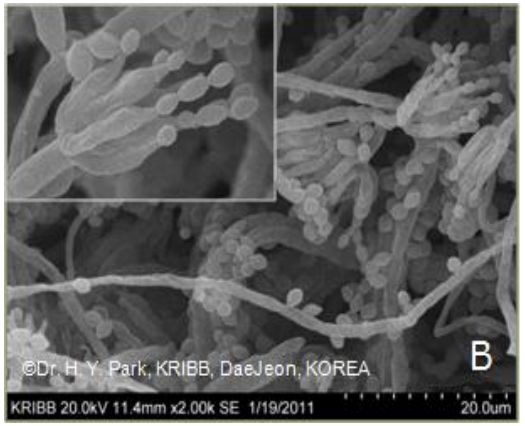
T. uticae infected by Paceipora

Microscope photo (1)

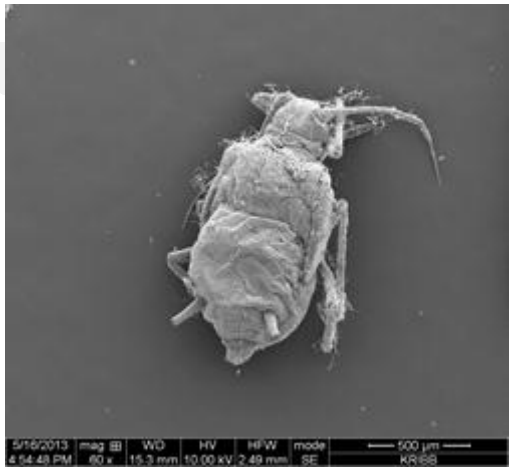
surface of dead *T. uticae* infected by Pacipora (*Paecilomyces* sp. HY-4)







Microscope photo (2)



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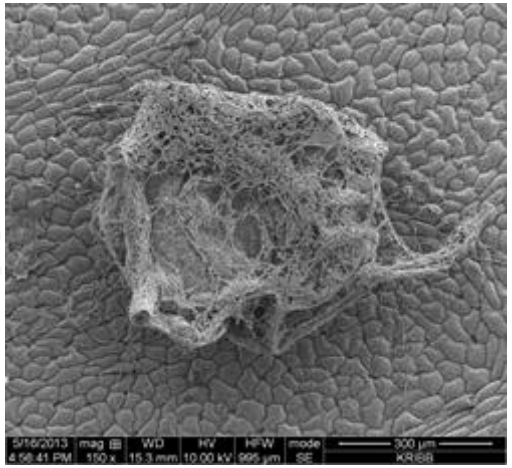

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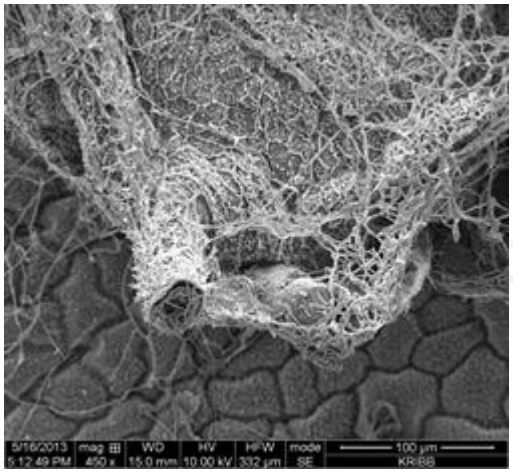

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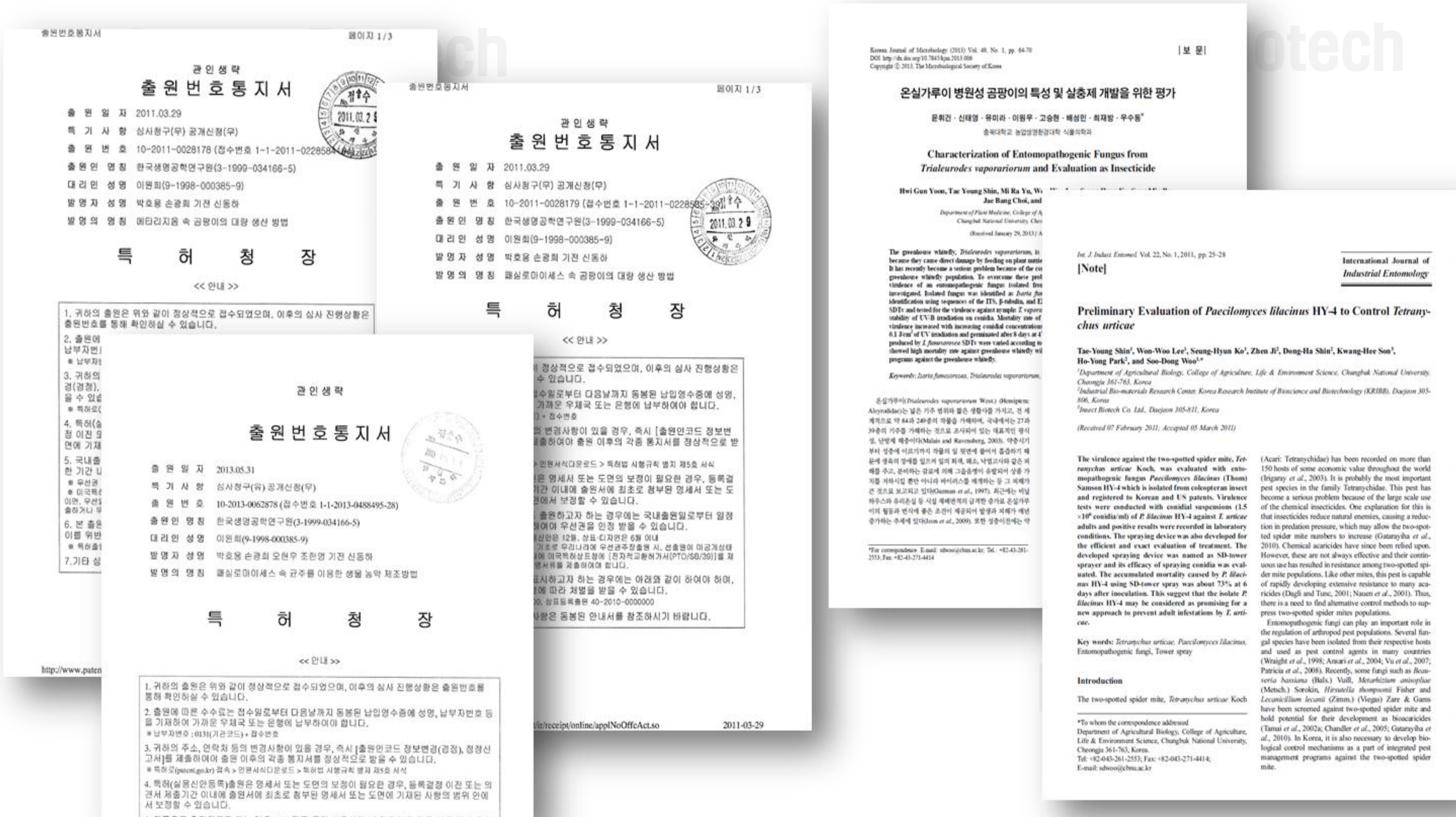
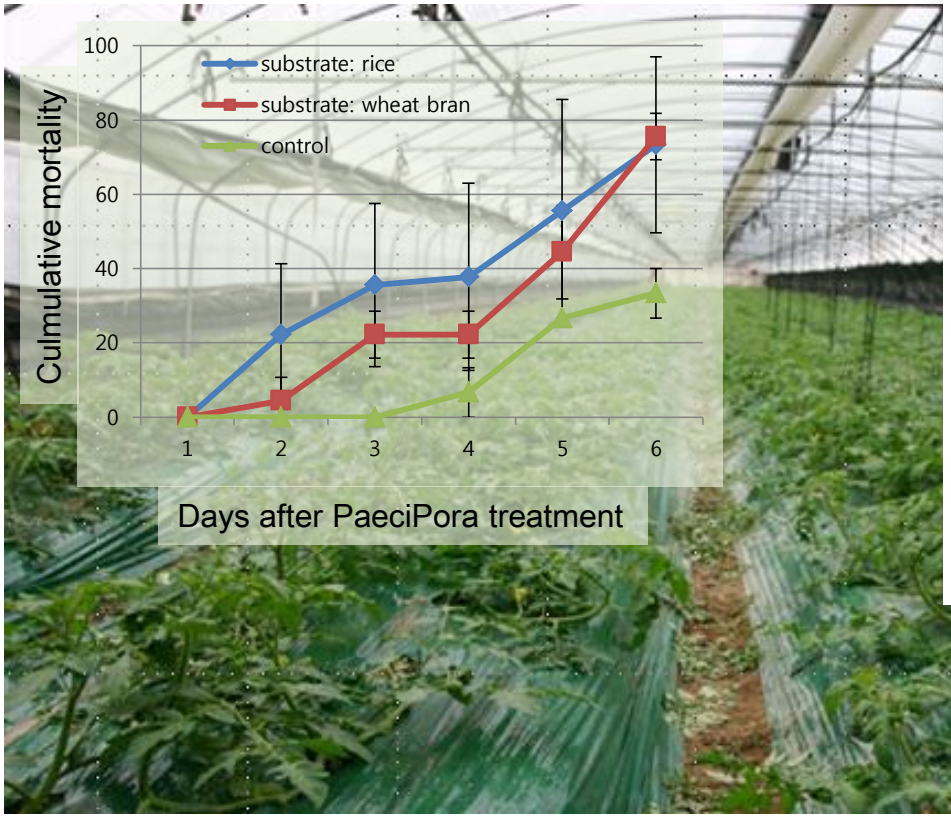
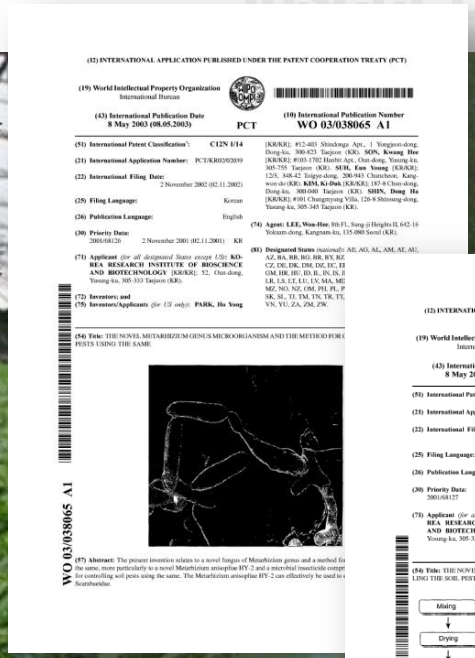
Patent and Review



Foster environmentally friendly farming using Paecipora

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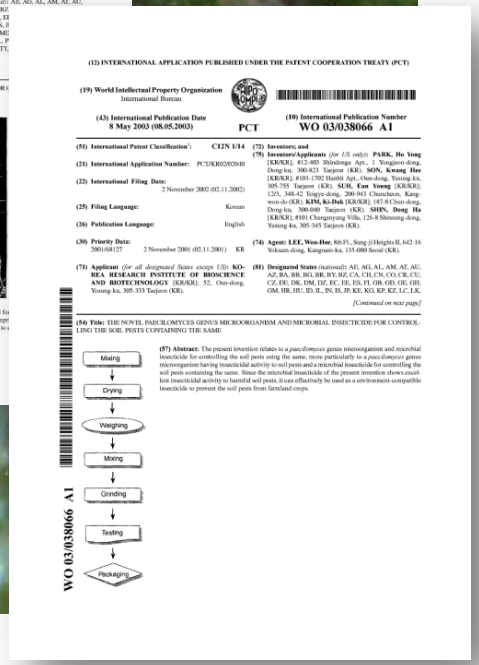
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Mixing
Drying
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Grinding
Testing
Packaging

Insect Biotech
Invention for Better Tomorrow

한국생명공학연구원
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