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Lepidopterous Insect Pests on Soybean

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콩의 나방류(蛾類)害虫에 關한 調査

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ABSTRACT

The list of lepidopterous pests on soybean represented in this paper is a result which has been carried out for the survey of insect pests of main crops under the Strengthening Plant Protection Research and Training Project, FAO/UNDP.

Forty eight lepidopterous pests which collected on soybean during this period are identified and the general biology of major pests is summarized.

Most of materials were collected in the stage of larva, which was injurious stage, on the injurious parts of soybean and reared in the laboratory.

Pod-borers

In Korea, the pod borers of soybean include the follving three species; *Leguminivora glycinivorella* Matsumura, *Matsumuraeses phaseoli* Matsumura, *Etiella inckenella* Trectichke.

1) *Leguminivora glycinivorella* Matsumura
(Soybean pod borer:콩나방)

This species is the most economic pest of soybean as pod borer in Korea. It is also distributed throughout Japan, China and Manchuria, which so far seems to be restricted to the Far-East region. Four species of leguminous plants have been known as host plants, soybean being the commonest one. The damage of soybean caused by *L. glycinivorella* differed prominently among soybean varieties owing to their maturing time. According to Choi and et al (1972), the early varieties are damaged more seriously than the late varieties; the early varieties 5.6%, the middle 4.8% and the late 1.7%, however sometimes higher than 34.1%.

Another experimental observation showed that infestation are apparently higher on the pubescent varieties of soybean. This is because females lay fewer eggs on varieties with hairless pods than on those with hairy pods.

According to field observation, there is one generation a year in Korea; the moths first appear in the middle of August and early of October, and live for 20-30 days. The females lay eggs singly, usually on the pods but sometimes on the stems and leaves; on pods 71.5%, on stems 18.1% and on leaves 10.4%. The eggs are oval, and pale yellow changing to red before they hatch. The egg incubation period is 7-8 days, and the newly hatched larvae spin a loose and white silken covering in the pod margin before entering into the pods and feed only on the developing seeds. The larvae are white changing to pale reddish yellow in the feeding stage. This species hibernates in a full-grown larva, encased in cocoons with soil particles under ground. Pupation begins late in July or early in August of the following year.

2) *Matsumuraeses phaseoli* Matsumura.
(Azuki pod worm;팥나방)

This species was recorded as a pod borer of soybean

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from Japan, the larva injures various species of leguminous plants, such as red beans, cowpeas, kidney beans and broad beans.

The larvae usually bind young leaves together to feed on them or bore into the stems, sometimes attack the seeds in Autumn. According to Razowski and Yasuda(1975), another species *Matsumuraeses falcana* (Walsingham) which closely resemble to *phaseoli* is also distributed in Japan and feed on soybean. Even the writers have not yet found this another species, there is a possibility to be occurred in Korea, considering its distribution.

The larvae were abundantly collected on soybean from the early of July to the early of August. We suppose that this species has three or more than three generations a year in Korea.

The biology of this species has not yet been studied in Korea.

3) *Etiella zinckenella* Treitschke

(Lima-bean pod borer:팥알락명나방)

This species is orginated in Europe and is now widely distributed in Far-East Asia and in the New World.

The larvae feed in the pods of legumes destroying the seeds. In China and Japan, this species has been known as a serious pest of soybean, but it is of negligible importance on soybean compare with the former two species in Korea. Various leguminous plants, such as soybeans, peas, string beans, lima beans, mung beans, etc, have been known as the host plants of this species.

The damage of soybean by this species has not yet been respectively surveyed in Korea. Pod injury due to this species is easily recognized by its specific characters, even without the presence of larva. The feeding mark is rough, the damaged pod contains large round excrement and has a large round hole through which the larva emerged.

The eggs are laid in the seed-pod of the legume and the larvae bore into the pods, feeding on the seeds.

The moth appears from the late of June to August. Pupation occurs either in the soil, form in a small cocoon of soil or inside the pods and it hibernates in the larval stage.

2. Leaf-rolling feeders;

The most serious and ubiquitous leaf-rolling feeders in Korea are *Sylepta ruralis* (Scopoli) and *Hedylepta indicata*(Fab.). The feeding habit of these two species is quite similar, so they have been confused each other in some Korean reports. A heavy infestation of these caterpillars leads to severe damage from their feeding activity.

1) *Sylepta ruralis* (Scopoli)

(Bean webworm;콩잎말이 명나방)

This species is the most common foliage feeding pest of soybean together *H. indicata* (Fab.) in Korea. The larva usually rolls leaves of soybean either one or two-three leaves together and feeds inside the rolled leaves. The damage caused by *S. ruralis* is sometimes very severe because the larva attacks every part of soybean; buds, flowers, leaves and pods, from the early stage of soybean. The moths appear from the late of June to September, most abundant period is from the late of July to the midle of August.

According to Han (1967), there are two or three generation in Korea; the first peak emergence has not been studied, the second of moths in the middle of July and the third from the late of August to the early of September. The females lay eggs in mass, usually behind the leaves of soybean. This species hibernates in the larval stage.

2) *Hedylepta indicata* (Fabricius)

(세줄콩 들명나방)

The damage by this species usually occurrs later than *S. ruralis*. The moths appear most frequently from the late of August to the middle of September. However the biology of this species has not yet been studied in Korea. This species is distributed throughout Korea, Japan, China, India and Ceylon.

3) *Adoxophyes orana* F. & R.

(Smaller tea tortrix;애모무늬잎말이나방)

This species is an economic pest as a leafroller in orchard and tea cultivated area. However, Honma(1973) separated to two species from these complexity; *A. orana* as a leaf roller of fruit trees and *A. fasciata* as a leaf roller of tea plants.

Many larvae were collected on injured soybean plants from the late of August.

4) *Mabra charonialis* Walker

(세점노랑 들명나방)

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3. Leaf

Numerous species of Lepidoptera have been known as leaf feeder of soybean. Among them, the most injurious species is *Chrysodeixis agnata*. and other noctuids feeder on soybean leaves in Korea include *Mythimna separata* Walker, *Paragabara ochreipennis* Sugi, *Herminia arenosa* Butler, *Apatele rumicis* Linnaeus, etc.

1) *Chrysodeixis agnata* Staudinger

(콩은무늬 밤나방)

The larva is a ravenous feeder which consumes entirely the whole leaf except main veins of soybean. This species was not previously reported as an economic pest of soybean from Korea, but it suddenly has been increased in population which can cause quite serious damage from 3-4 years before and lists as a major pest of soybean in Korea.

According to the result of observation in the laboratory, there are 4-5 generations a year in Korea (Suweon). The moths first appear in the early of May and the female lay eggs singly on the back surface of leaf. The hibernation of this species is not certain.

C. eriosoma which has been known as a pest of soybean is superficially resemble to this species, but has not yet been found on soybean in Korea by authors.

4. Soil inhabitants.

Several soil-inhabiting lepidopterous lavae, mainly noctuid cut-worms, injure plants by chewing them at or near ground level. They may also feed on roots and leaves. The most common cut-worms that damage soybean are *Agrotis ipsilon* Hufnagel and *Euxoa fucosa* Butler. The moths of the former appear abundantly from July to October in Korea. The larvae are omnivorous and damage every kind of upland crops.

Table 1. List of lepidopterous pests on soybean

Family	Scientific names	Injured parts				
		Pod	Seed	Stem	Petiole	Leaf
Gelechiidae	1. *Anarsia* sp.					0
	2. *Unknown* sp.					0
Cochylidae	3. *Phalonidia vectisana* Hump. & West.				0	0
Tortricidae	4. *Leguminivora glycinivorella* Mats.		0			
	5. *Matsumuraeses phaseoli* Mats.	0	0	0	0	0
	6. *Olethreutes* sp.					0
	7. *Adoxophes orana* F. & R.					0
	8. *Archippus breviplicanus* (Walsiphan)					0
	9. *Pandemis dumetana* Treit.					0
Pyralidae	10. *Etiella zinckenella* Treit.	0	0			
	11. *Hedylepta indicata* (Fabricius)					0
	12. *Sylepta* ruralis (Scopoli)	0			0	0
	13. *Mabra charonialis* Walker					0
	14. *Maruca testulalis* Geyer	0	0	0	0	
	15. *Ostrinia scopulalis* Walker			0		0
	16. *Ostrinia furnacalis* (Guenee)			0		0
	17. *Nomophila noctuella* Schiff.					0
	18. *Nymphula turbata* Butler					0
	19. *Emmalocera* sp.					0
Noctuidae	20. *Chrysodeixis agnata* st.					0
	21. *Autographa purissima* Butler					0
	22. *Agrotis ipsilon* Hüfnagel			0		0
	23. *Euxoa fucosa* Butler			0		0

	24. *Herminia arenosa* Butler					0
	25. *Hypena tristalis* Lederer					0
	26. *Mythimna separata* Walker					0
	27. *Heliothis viriplaca adaucta* Butler	0	0			0
Noctuidae	28. *Paragabara ochreipennis* Sugi					0
	29. *Apatele rumicis* Linnaeus					0
	30. *Mocis undata* Fabricius					0
	31. *Diarsia* sp. (close to *canescens* B.)					0
	32. *Amyna* sp.					0
	33. *Mamestra brassicae* (Linn.)	0				0
	34. *Spodoptera litura* Fabricius					0
Lymantridae	35. *Lymantria dispar* Linne					0
	36. *Euproctis similis* Fuessly					0
	37. *Euproctis flava* Bremer					0
Arctiidae	38. *Celama taeniata* Snell.					0
	39. *Hyphantria cunea* Drury					0
Geometridae	40. *Ascotis cretacea* Butler					0
	41. *Biston thoracicaria* Ob.					0
	42. *Bizia aexaria* Walker					0
	43. *Scopula emissaria* Butler					0
	44. *Serraca punctinalis* Scopoli					0
	45. *Ectropis* sp.					0
Limacodidae	46. *Miroleocn longipalpis* Butl er					0
Lycaenidae	47. *Plebejus argus micrargus* Butler					0
Pieridae	48. *Colias erate poliographis* Mot.					0
Satyridae	49. *Mycalesis gotama julignia* Fruh.					0

摘　要

필자들은 우리나라에서 發生되고 있는 콩害虫中 나방류害虫을 대상으로 調査한바 총 49種이 채집 分類되었으므로 그 목록을 발표한다. 또한 그들은 加害형태별로 大別하여 콩粒 및 꼬투리를 加害하는 種類, 잎을 말고 加害하는 種類, 잎을 食害하는 種類 그리고 토양에 서식하며 加害하는 種類등으로 區分하고 각 무리의 重要種들에 對하여 槪略的인 生活史 및 被害狀況등을 기술하였다.

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