

Lepidopterous Insects Composition in Jindo Island, Korea in Summer

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ABSTRACT

We surveyed the biodiversity of lepidopterous insects in Jindo Island using UV bucket trap in July 2016 to determine the relationship between surrounding environment and ecosystem in order to contribute to biodiversity conservation and management of coastal islands in Korea. Based on our survey results, a total of 262 lepidopterous insect species in 16 families were collected from Jindo Island. Members belonging to families Noctuidae and Geometridae made up approximately half of the total species (86 species [32.82%] in Noctuidae and 44 species [16.79%] in Geometridae). There were 29 species (11.07%) belonging to Crambidae and 28 species (10.69%) belonging to Pyralidae. As a result of all collections based on previous literature and this study, a total of 730 species belonging to 34 families were collected from Jindo Island, including 33 protected species, 242 species (33.15%) belonging to Noctuidae (the most abundant), 124 species (16.99%) belonging to Geometridae, 79 species (10.82%) belonging to Crambidae, and 65 species (8.90%) belonging to Pyralidae. The most frequently collected species was *Lamoria glauca* in this study. Our results on the diversity of lepidopterous insects will provide basic information for future investigation on diverse changes in the ecosystem of Jindo Island, Korea.

Keywords: lepidopterous insect, diversity, Jindo Island, bucket trap, Korea

INTRODUCTION

Jindo Island is the third largest island and located in province of Jeollanam-do in South Korea. The island is the principle island among the cluster of 230 islets in the south western part of the Korean peninsula. The island has many park reserves like the Dadohae National Marine Park, historical relics and sites. According to the weather data from Haenam meteorological station closest to the investigation, the average temperature for the year is 14.4°C, and the mean annual precipitation is 1,360.2 mm (average last 30 years, National Weather Service) (Korea Meteorological Administration, 2013).

National Institute of Environmental Research (2012a, 2012b, 2012c, 2012d, 2012e, 2012f) studies on the insect fauna on Jindo Island reported 671 species belonging to 108 families of 12 Orders and identified 412 species of 28 families in lepidopterous insects. Also Sohn et al. (2005) are

reported a total of 573 lepidopterous species belonging to 37 families. The objective of the present study was to clarify insect fauna from Jindo Island. The results of this study might offer distinctive information for biodiversity conservation and management of coastal islands in Korea. We focused on lepidopterous insect fauna to provide basic information for future research studies to investigate the causes of diverse changes in the ecosystem of Jindo Island.

MATERIALS AND METHODS

Since insects have diversified habitats and behavioral habits, we used as many different collection methods as possible according to the characteristics of adults of each taxonomic group. This research targeted samples caught by installing UV bucket trap. To collect lepidopterous insects in the entire Jindo Island, one circular 12 W UV bucket trap powered by

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12 V battery (Bioquip, Rancho Dominguez, CA, USA) was installed in a spot. UV bucket traps were installed at 6 sites (Fig. 1) where insects could be collected automatically. Collecting activities were focused on lepidopterous insects that occupied the largest taxa among insects of the forest ecosys-

tem. Lepidopterous insects caught in the trap were collected the next day. They were killed by ethyl-acetate and KCN.

Insect specimens were classified at family level. They were identified based on the description in the ‘Checklist of Korean Insects (Paek et al., 2010).’

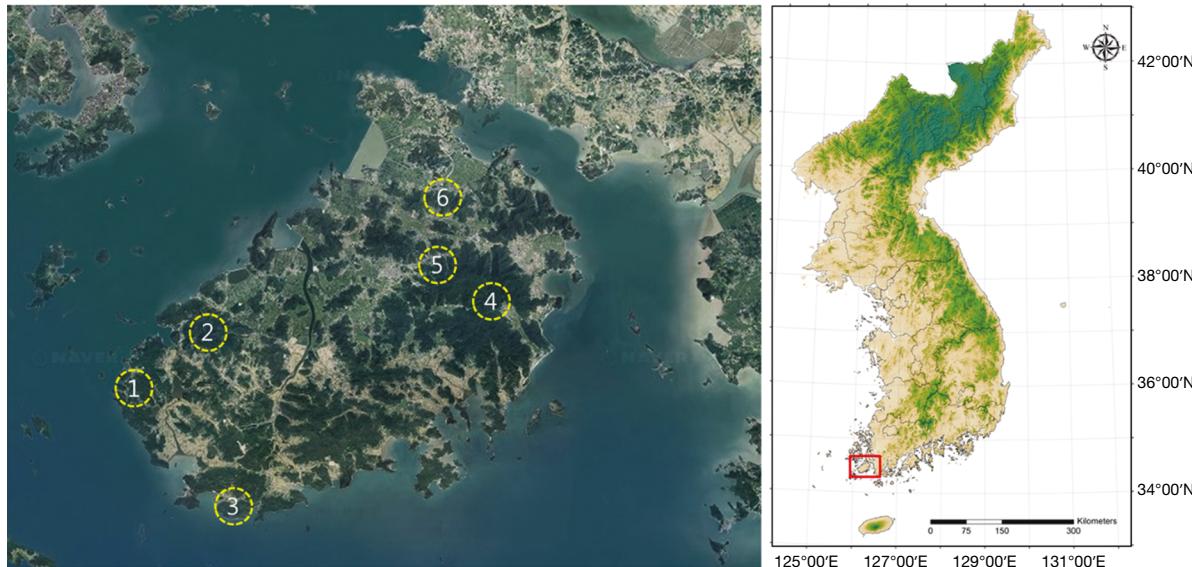


Fig. 1. Study areas and dates of field survey in Jindo Island.

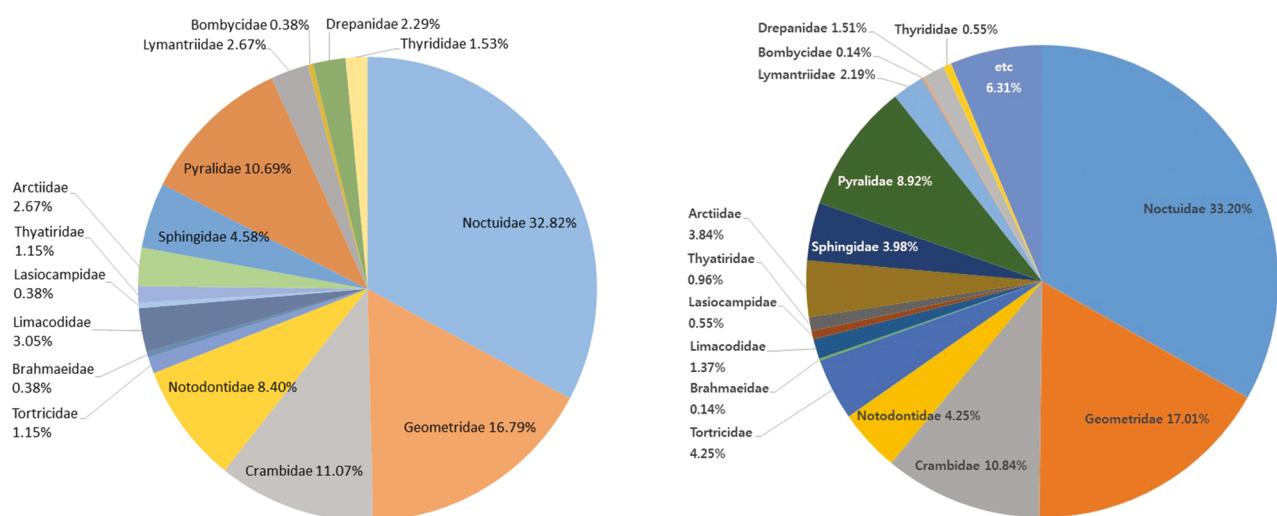


Fig. 2. Taxonomic group composition of the lepidopterous insect on Jindo (left, surveys; right, all the collections).

RESULTS AND DISCUSSION

Taxonomic composition

From the surveys, a total of 262 insect species belonging to 16 families were collected from Jindo Island. Members of Noctuidae and Geometridae made up approximately half of the total species. There were 86 species (32.82%) belonging to Noctuidae and 44 species (16.79%) belonging to Geometridae. There were 29 species (11.07%) belonging to Crambidae and 28 species (10.69%) belonging to Pyralidae. As a result of all collections based on literature and this study, 730 species belonging to 34 families were identified for Jindo Island, including 33 protected species. There are 242 species (33.15%) belonging to Noctuidae, which is the most abundant in the collections. There are 124 species (16.99%) belonging to Geometridae, 79 species (10.82%) belonging

to Crambidae, and 65 species (8.90%) belonging to Pyralidae (Table 1, Fig. 2, Appendix 1).

In the 6 study sites of this study, Jiryeoksan (S2) showed the highest species diversity with 268 individuals (141 species), followed by Geubchisan (S1) with 236 individuals (99 species), Godusan (S6) with 155 individuals (89 species), Cheondungsan (S3) with 155 individuals (79 species), Cheomchalsan-2 (S5) with 119 individuals (69 species), and Cheomchalsan-1 (S4) with 118 individuals (69 species). For individuals collected, there were 766 individuals belonging to Noctuidae, the largest family in Jindo Island, followed by 452 individuals belonging to Pyralidae, 439 individuals belonging to Crambidae, 370 individuals belonging to Geometridae, and 185 individuals belonging to Notodontidae (Appendix 1).

The most frequently collected species was *Lamoria glau-*

Table 1. The total number of lepidopterous insect species and individuals in the results of previous literatures and the present study in Jindo Island

Family	2016		2012		2005		Total		Relative dominance (%)
	No. of species	No. of individuals							
Noctuidae	86	248	134	281	166	237	242	766	33.15
Geometridae	44	131	68	142	85	166	124	439	16.99
Crambidae	29	169	50	110	46	91	79	370	10.82
Notodontidae	22	82	18	42	24	61	31	185	4.25
Tortricidae	3	3	8	18	25	59	31	80	4.25
Oecophoridae	—	—	4	7	4	153	6	161	0.82
Brahmaeidae	1	1	1	1	1	1	1	2	0.14
Ctenuchidae	—	—	1	2	1	1	1	3	0.14
Zygaenidae	—	—	3	5	2	11	3	16	0.41
Limacodidae	8	12	6	25	9	30	10	67	1.37
Epiplemidae	—	—	2	3	2	2	2	5	0.27
Lasiocampidae	1	4	3	5	2	2	4	11	0.55
Saturniidae	—	—	3	4	2	2	4	6	0.55
Lecithoceridae	—	—	1	1	1	5	2	6	0.27
Gelechiidae	—	—	1	1	11	34	12	35	1.64
Thyatiridae	3	14	7	12	5	6	7	32	0.96
Arctiidae	7	13	14	21	25	31	28	65	7.12
Sphingidae	12	36	21	50	25	36	29	122	3.97
Pyralidae	28	204	43	86	40	162	65	452	8.90
Lymantriidae	7	41	11	26	11	28	16	95	2.19
Bombycidae	1	2	—	—	1	2	1	4	0.14
Cossidae	—	—	1	5	1	2	1	7	0.14
Drepanidae	6	44	5	14	9	14	11	72	1.51
Gracillariidae	—	—	1	1	1	1	1	1	0.14
Psychidae	—	—	2	4	—	—	2	4	0.27
Yponomeutidae	—	—	1	1	1	43	3	45	0.41
Nolidae	—	—	—	—	1	1	1	1	0.14
Cochylidae	—	—	—	—	2	2	2	2	0.27
Stathmopodidae	—	—	—	—	1	1	1	1	0.14
Tineidae	—	—	—	—	1	1	1	1	0.14
Blastobasidae	—	—	—	—	2	4	2	4	0.27
Sessidae	—	—	—	—	1	1	1	1	0.14
Epicopeiidae	—	—	—	—	1	1	1	1	0.14
Thyrididae	4	7	3	5	3	6	4	18	0.55
Total	262	1,051	412	872	512	1,197	730	3,080	

Table 2. List of notable and legally protected lepidopterous insects from Jindo Island

Classification		Species
Endangered species	Level I	–
	Level II	–
Management of expotable species		<i>Actias artemis, Actias gnoma, Ambulyx japonica koreana, Antheraea yamamai, Comibaena tenuisaria, Dichomeris lespedezae, Dichomeris strictella, Endotricha parki, Goniorhynchus exemplaris, Heda auricristana, Hyposemansis albipuncta, Lymantria dispar, Metaeuchrominus flavofascialis, Moma tsushima, Oruza kunsuki, Ourapteryx persica, Prolepsis diazoma, Promalactis odaiensis, Pyrausta mutuurai, Rhodoneura shini, Samia Cynthia, Sinomphisa plagialis, Teliphisa albifusa</i>
Endemic species		<i>Dichomeris lespedezae, Dichomeris strictella, Metaeuchrominus flavofascialis, Oruza kunsuki, Promalactis odaiensis, Rhodoneura shini, Teleiodes yanyangensis, Tornodoxa longiella</i>
Korean red list		–
IUCN red list		–
Climate-sensitive indicator species		<i>Macrauzata maxima, Marumba spectabilis</i>

IUCN, International Union for Conservation of Nature.

calis in all collections. It was also the most dominant species collected in this study. Other frequently caught species were species belonging to Noctuidae (including *Hydrillodes funeralis* and *Hydrillodes pacificus*), Crambidae (including *Bradina geminalis*, *Pleuroptya chlorophanta*, *Herpetogramma luctuosalis*, and *Tyspanodes hypsalis*), and Pyralidae (such as *Herculia pelasgalis*) (Appendix 1).

Protected species

There were no endangered species or government protected species found in any of these samples. However, there were four Endemic species and one climate-sensitive indicator species (Table 2).

We enumerated the 730 insected species distributed in Jindo Island based on the present study and previous literatures. Further detailed studies including seasonal surveys using other methods are needed to investigate insects in this area for the purpose of biodiversity conservation and management of coastal islands in Korea.

ACKNOWLEDGMENTS

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Appendix 1. Taxonomic list of the lepidopterous insects in Jindo Island

Appendix 1. Continued

Appendix 1. Continued

Families	Scientific name	Species	2016						2012 ^{a,b,c,d,e,f}					
			S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6
Pyralidae	umblewing	<i>Stemmatophora valida</i>	검은날개비단명나방	2	1	-	1	-	-	-	1	-	1	31
		<i>Stericta kogii</i>	티어형집명나방	3	-	-	-	-	-	-	2	-	2	1
		<i>Tamraea torridalis</i>	청줄비단명나방	1	3	2	2	2	1	5	1	-	-	-
		<i>Tegulifera bicoloralis</i>	청띠비단명나방	-	-	2	2	-	1	2	-	-	-	-
		<i>Teliphasa elegans</i>	푸른빛집명나방	1	-	1	-	-	-	2	1	-	-	-
		<i>Teliphisa albifusa</i>	흰날개큰집명나방	-	-	-	-	-	-	1	1	-	-	-
		<i>Termitoptycha inimica</i>	검스레집명나방	-	-	1	-	-	-	1	1	-	-	-
		<i>Termitoptycha margarita</i>	흰날개집명나방	2	-	1	-	-	-	1	1	2	-	-
		<i>Termitoptycha nigrescens</i>	흰무늬집명나방불이	-	-	1	-	-	-	1	-	-	-	-
		<i>Trachycera paradichromella</i>	-	-	-	-	-	-	1	1	-	-	-	30
Blastobasidae	밀두리풀나방과	<i>Trebana flavidfrontalis</i>	붉은머리비단명나방	-	-	-	-	-	-	-	-	2	-	-
		<i>Trichophyrsa jucundalis</i>	녹색집명나방	-	-	-	-	-	-	-	-	1	-	-
		<i>Neoblastobasis decolor</i>	남방밀두리풀나방	-	-	-	-	-	-	-	2	-	-	-
		<i>Neoblastobasis spinitharpeila</i>	내점밀두리풀나방	-	-	-	-	-	-	-	2	-	-	-
		<i>Acosmeryx castanea</i>	신포도박각시	-	-	-	-	-	-	-	-	-	-	-
		<i>Agrius convolvuli</i>	포도박각시	-	-	-	-	-	-	-	-	-	-	-
		<i>Agrius naga</i>	박각시	-	-	-	-	-	-	-	-	-	-	-
		<i>Ambulyx japonica koreana</i>	갈고리박각시	-	-	-	-	-	-	-	-	-	-	-
		<i>Ambulyx ochracea</i>	첨갈고리박각시	-	-	-	-	-	-	-	-	-	-	-
		<i>Ambulyx schauffelbergeri</i>	노랑갈고리박각시	-	-	-	-	-	-	-	-	-	-	-
Sphingidae	박자시과	<i>Ampelophaga rubiginosa</i>	머루박각시	1	-	-	-	-	-	-	1	1	-	-
		<i>Aspedon himachala</i>	별꼬리박각시	-	-	-	-	-	-	-	-	-	-	-
		<i>Callambulyx tatarinovi</i>	녹색박각시	-	2	-	-	-	-	-	1	1	-	-
		<i>Cephalodes hydas</i>	줄녹색박각시	-	-	1	-	-	-	-	3	-	-	-
		<i>Clanis bilineata</i>	궁박각시	-	-	-	-	-	-	-	1	1	-	-
		<i>Clanis undulosa</i>	무늬궁박각시	-	-	-	-	-	-	-	1	1	-	-
		<i>Deilephilia elpenor</i>	주홍박각시	-	-	-	-	-	-	-	2	1	-	-
		<i>Dolbina exacta</i>	에물절박각시	3	-	-	-	-	-	-	3	2	-	-
		<i>Dolbina tancrei</i>	물결박각시	-	1	-	-	-	-	-	3	3	-	-
		<i>Hemaris affinis</i>	검정황나포리박각시	-	-	-	-	-	-	-	1	1	-	-
Macroglossinae		<i>MacroGLOSSUM pyrrhosticta</i>	별포리박각시	-	-	-	-	-	-	-	2	1	-	-
		<i>Macroglossum stellatarum</i>	포리박각시	-	-	-	-	-	-	-	1	-	1	-
		<i>Marumba gaschkevitschi</i>	분홍등줄박각시	-	-	-	-	-	-	-	1	-	2	-
		<i>Marumba jankowskii</i>	치은동줄박각시	-	-	-	-	-	-	-	1	-	3	-
		<i>Marumba spectabilis</i>	체주동줄박각시	-	-	-	-	-	-	-	1	-	1	-
		<i>Marumba sperchioides</i>	동줄박각시	-	-	-	-	-	-	-	2	-	2	-
		<i>Parum colligata</i>	다나무박각시	-	-	-	-	-	-	-	1	-	3	-
		<i>Philosphyngia dissimilis</i>	벗나무박각시	1	2	-	-	-	-	-	2	-	1	-
		<i>Psilogramma increta</i>	큰주름박각시	-	1	2	-	-	-	-	1	-	3	-
		<i>Rhagastis mongoliana</i>	우단박각시	-	1	2	-	-	-	-	1	-	3	-
Theretrinae		<i>Smerinthus planus</i>	뱀눈박각시	-	-	-	-	-	-	-	1	-	1	-
		<i>Theretra clotho</i>	큰줄박각시	-	-	-	-	-	-	-	1	-	3	-
		<i>Theretra japonica</i>	줄박각시	-	-	-	-	-	-	-	4	-	3	-

Appendix 1. Continued

Families	Scientific name	Species	2016						2012 ^{a,b,c,d,e,f}						2005 ^g		
			S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6	S1	S2	
Noctuidae	밤나방과	<i>Acontia bicolora</i> <i>Acrapex azumai</i> <i>Acronicta (Plataplecta) pulverosa</i> <i>Acronicta hercules</i> <i>Acronicta major</i> <i>Acronicta rumicis</i> <i>Adrapsa simplex</i> <i>Adris tyranus</i> <i>Agrotis ipsilon</i> <i>Amphyipyra acheron</i> <i>Amphyipyra livida</i> <i>Amphyipyra monolitha</i> <i>Amphyipyra pyramidea</i> <i>Anachrostis nigripunctalis</i> <i>Anapamea incerta</i> <i>Anomis commoda</i> <i>Anomis flava</i> <i>Anomis mesogona</i> <i>Anuga multiplicans</i> <i>Arcte coerula</i> <i>Artena dorata</i> <i>Athetis albisignata</i> <i>Athetis cinerascens</i> <i>Athetis dissimilis</i> <i>Athetis gluteosu</i> <i>Athetis stellata</i> <i>Athetis striolata</i> <i>Atrachea nitens</i> <i>Aventiola pusilla</i> <i>Axylia putris</i> <i>Blasticorhinus ussuriensis</i> <i>Blenina senex</i> <i>Bomolocha melanica</i> <i>Bomolocha stygiana</i> <i>Brevipecten consanguis</i> <i>Bryophilà granitalis</i> <i>Bryophilina mollicula</i> <i>Callopistria albolineola</i> <i>Callopistria duplicans</i> <i>Callopistria juventina</i> <i>Callopistria repleta</i> <i>Calyptra gruesa</i> <i>Calyptra hokkaidia</i>	노랑무늬꼬마밤나방 에밤나방 흰배저녁나방 점줄저녁나방 왕뿔무늬저녁나방 배저녁나방 별박이수염나방 으름밤나방 검거세미밤나방 꽃겹은까마귀밤나방 까마귀밤나방 회눈까마귀밤나방 파란밀끼마귀밤나방 흰무늬젤름나방 꼬마주황얼룩밤나방 큰붉은얼밤나방 목회오밤나방 무궁화잎밤나방 간수염비행기밤나방 암청색줄무늬밤나방 푸른띠밤나방 한접국화밤나방 흑접밤나방 꽃흰날개담색밤나방 각시띠담색밤나방 국화밤나방 줄담색밤나방 소루챙이밤나방 꽃무늬꼬마밤나방 썩은밤나방 우수리밤나방 나무껍질밤나방 먹구름수염나방 고개무늬수염나방 남방성무늬줄름나방 이끼밤나방 연푸른꼬마밤나방 흰줄어린밤나방 제주어린밤나방 아린밤나방 얼룩어린밤나방 큰갈고리밤나방 부령갈고리밤나방	-	-	-	-	-	-	-	-	-	-	-	-	2	1
															2	2	
															1	1	
															1	1	
															3	1	
															1	1	
															6	1	
															-	1	

Appendix 1. Continued

Families	Scientific name	Species	2016						2012 ^{a,b,c,d,e,f}							
			S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6		
Noctuidae	밤나방과	<i>Calyptra thalictri</i> <i>Catocala dissimilis</i> <i>Catocala doerriesi</i> <i>Catocala dula</i> <i>Catocala fulminea</i> <i>Catocala jonasii</i> <i>Catocala praegnax</i> <i>Chibidkuga hypernodes</i> <i>Chrysodeixis eriosoma</i> <i>Chrysorithrum amatum</i> <i>Cidariplura gladiata</i> <i>Coenobia orientalis</i> <i>Colocasia mus</i> <i>Condica illecta</i> <i>Conistra grisescens</i> <i>Corgatha dictaria</i> <i>Corgatha nitens</i> <i>Corgatha pygmaea</i> <i>Corsa petrina</i> <i>Cosmia achatinia</i> <i>Cosmia affinis</i> <i>Cosmia campostigma</i> <i>Craniophora fasciata</i> <i>Craniophora jankowskii</i> <i>Craniophora odade</i> <i>Cryphiala obscura</i> <i>Ctenoplusia (Acanthoplusia) agnata</i> <i>Ctenoplusia albostriata</i> <i>Cymatophoropsis unca</i> <i>Daddala lucilla</i> <i>Diarsia canescens</i> <i>Dinumma deponens</i> <i>Diomea cremata</i> <i>Diomea discisigna</i> <i>Diphtherocone alpium</i> <i>Dysgonia arctotaenia</i> <i>Dysgonia arcuata</i> <i>Dysgonia mandshuriana</i> <i>Dysgonia maturata</i> <i>Dysmilichia gemella</i> <i>Earias pudicana</i> <i>Earias roseifera</i> <i>Ectogonia butleri</i>	갈고리밤나방 풀흰무늬박이꽃날개나방 검은줄노랑꽃날개나방 붉은꽃날개나방 광대노랑꽃날개나방 뿔죽노랑꽃날개나방 들노랑꽃날개나방 포마검체찰름나방 붉은금무늬밤나방 사랑밤나방 흔첩햇수염나방 천출물가辨别나방 법보벼침나방 희미무늬밤나방 검풀무늬밤나방 흔출꼬마밤나방 붉은꼬마밤나방 검은줄꼬마밤나방 진줄밤나방 제주꼬마밤나방 느릅밤나방 회색상술밤나방 검은무늬저녁나방 지죽저녁나방 향토저녁나방 띠이끼밤나방 콩온무늬밤나방 긴금무늬밤나방 남방재무늬저녁나방 톱날무늬잎밤나방 물결밤나방 검은피밤나방 보라잎밤나방 내눈검체잎밤나방 늙은산체저녁나방 흰띠수충다리밤나방 물결수충다리밤나방 복방수충다리밤나방 보라풀수충다리밤나방 검띠에기밤나방 붉은가밤나방 분홍무늬푸른밤나방 불록찰름나방	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 1. Continued

Families	Scientific name	2016						2012 ^{a,b,c,d,e,f}						2005 ^g		
		S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6			
Noctuidae	밤나방과	<i>Edessena hamada</i> <i>Ercheia niveostrigata</i> <i>Ercheia umbrosa</i> <i>Erebis ephesperis</i> <i>Erygia apicalis</i> <i>Erythroplasia pyropia</i> <i>Erythroplasia rutifrons</i> <i>Eutelia geyeri</i> <i>Euvillemania angulata</i> <i>Euxoa sibirica</i> <i>Gabala argentata</i> <i>Gadirtha uniformis</i> <i>Gelastocera exusta</i> <i>Gelastocera exusta</i> <i>Gerbathodes angusta</i> <i>Goneptica opalina</i> <i>Hadena rivularis</i> <i>Hademia incongruens</i> <i>Hadjina chinensis</i> <i>Helicoverpa armigera</i> <i>Helicoverpa assulta</i> <i>Hemipecta fallax</i> <i>Herminia arenosa</i> <i>Herminia dolosa</i> <i>Herminia innocens</i> <i>Herminia tarsicinalis</i> <i>Herminia tarsicinalis</i> <i>Hermonassa cecilia</i> <i>Hipoepa fractalis</i> <i>Hoplodrina impletata</i> <i>Hydrellodes funeralis</i> <i>Hydrellodes pacificus</i> <i>Hypena (Bomolocha) bicoloralis</i> <i>Hypena amica</i> <i>Hypena claripennis</i> <i>Hypena trigonalis</i> <i>Hypena (Bomolocha) nigrobasalis</i> <i>Hypenodes curvilinea</i> <i>Hyperstrotia flavipuncta</i> <i>Hypersynoides submarginata</i> <i>Hypopasada vespertilio</i> <i>Hypocephala brunnea</i> <i>Hyposemans albipuncta</i>	성북판수 엷나방 청백무늬밤나방 보라무늬밤나방 왕황줄태국나방 구름잎밤나방 붉은등은무늬밤나방 포마은무늬밤나방 비행기 밤나방 우뚝날개찰름나방 시베리아밤나방 은무늬포진애기 밤나방 남방검질밤나방 검은띠애기나방 검은띠애기밤나방 에자녁나방 붉은띠찰름나방 줄한무늬밤나방 검은띠애기밤나방 중국두점박이밤나방 왕담배나방 담배나방 외별产业扶贫나방 세줄무늬수염나방 미분교수염나방 물결수염나방 길색줄수 엷나방 길색줄수 엷나방 첨박이밤나방 꽃날개수 엷나방 주율밤나방 넓은띠흑수 엷나방 담흑수 엷나방 흰무늬수 엷나방 꽃노랑수 엷나방 각시꽃노랑수 엷나방 대만수염나방 별보라수 엷나방 황줄꼬마찰름나방 검은두줄자마밤나방 검스레황벌밤나방 큰갈색띠밤나방 줄무늬포마밤나방 날개풀철무늬밤나방	3	3	-	-	-	-	2	2	2	2	5	2	2
								2	2	2	2	1	1	1		

Appendix 1. Continued

Families	Scientific name	Species	2016						2012 ^{a,b,c,d,e,f}							
			S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6		
Noctuidae	밤나방과	<i>Idia curvipalpis</i> <i>Iragaodes nobilis</i> <i>Lacera procellosa</i> <i>Lagoptera juno</i> <i>Leiostola mollis</i> <i>Lophomilia polybapta</i> <i>Lophoptera hayesi</i> <i>Lophoruzza pulcherrima</i> <i>Lygophila craccae</i> <i>Lygophila maxima</i> <i>Lygophila vulcanea</i> <i>Macdunnoughia hybrida</i> <i>Macdunnoughia purissima</i> <i>Maguda suffusa</i> <i>Maliattha rosacea</i> <i>Maliattha signifera</i> <i>Mecodina cinereaea</i> <i>Mecodina nubiferalis</i> <i>Metopta rectifasciata</i> <i>Microxyla confusa</i> <i>Mimachrostia fasciata</i> <i>Mimeusemia persimilis</i> <i>Mocis ancilla</i> <i>Moma tsushima</i> <i>Mythimna (Aletia) flavostigma</i> <i>Mythimna (Aletia) nigrolinea</i> <i>Mythimna (Aletia) placida</i> <i>Mythimna (Analeitia) postica</i> <i>Mythimna matsumuriana</i> <i>Mythimna stolida</i> <i>Mythimna turca</i> <i>Naenia contaminata</i> <i>Naganella timandra</i> <i>Naranga aenesceps</i> <i>Necodina subviolacea</i> <i>Negritothripa hampsoni</i> <i>Neustrotia rectilineata</i> <i>Niphonymx segregata</i> <i>Nodaria tristis</i> <i>Nonagria turpis</i> <i>Oligia fodinae</i> <i>Oligonyx vulnerata</i>	복파는밤나방 안노랑모밤나방 울통풀통밤나방 무궁화밤나방 생줄잘름나방 얼룩잘름나방 가는혹갈색밤나방 꽃꼬마밤나방 햇빛목걸은밤나방 큰목걸은밤나방 갈색목걸은밤나방 사춘은무늬밤나방 은무늬밤나방 침새처럼밤나방 장미꼬마밤나방 넓은피월꼬마밤나방 글ჭ에기잎밤나방 남방구리밤나방 흔출태극나방 세모무늬꼬마밤나방 검은줄노랑찰름나방 애기얼룩나방 포마구름무늬밤나방 구름무늬밤나방 비바리치역나방 얼룩줄무늬밤나방 검은띠줄무늬밤나방 뒷검은줄무늬밤나방 갈색점밤나방 깊은산파밤나방 큰점박이줄무늬밤나방 상파밤나방 터번운밤나방 신부쩔诘나방 벼애나방 보라애기잎밤나방 한무늬껍질밤나방 이란황꼬마밤나방 청경퀴밤나방 굵은수염나방 여두운벼밤나방 사각무늬밤나방 풀갈색밤나방	-	1	-	-	-	-	1	-	-	-	-	-	-

Appendix 1. Continued

Families	Scientific name	Species	2016						2012 ^{a,b,c,d,e,f}						2005 ^g		
			S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6			
Noctuidae	밤나방과	<i>Olivembula obertueri</i> <i>Ophiusa tirhaca</i> <i>Oraesia emarginata</i> <i>Oraesia excavata</i> <i>Orthogonia sera</i> <i>Oruza divisa</i> <i>Oruza glaucoptera</i> <i>Oruza kunsuki</i> <i>Oruza mira</i> <i>Ozarba punctigera</i> <i>Pangrapta costinotata</i> <i>Pangrapta curialis</i> <i>Pangrapta flavomacula</i> <i>Pangrapta obscurata</i> <i>Pangrapta perturbans</i> <i>Pangrapta trilineata</i> <i>Pangrapta trimantosalis</i> <i>Panthea coenobita</i> <i>Paracolax fentonii</i> <i>Paracolax pryeri</i> <i>Paragabara flavomacula</i> <i>Paragona inchoata</i> <i>Perinaenia accipiter</i> <i>Perynea ruficeps</i> <i>Perynea subrosea</i> <i>Plusia festucae</i> <i>Plusia putnami</i> <i>Plusiodonta casta</i> <i>Polyphaenis subviridis</i> <i>Protodeltote pyarga</i> <i>Protomiselia bilinea</i> <i>Pseudaleitia separata</i> <i>Pseudolips fagana</i> <i>Rhynchina cramboides</i> <i>Rivula inconspicua</i> <i>Sarbanissa subtilava</i> <i>Sarbanissa venusta</i> <i>Scedopla koreana</i> <i>Sesamia inferens</i> <i>Sideridis unica</i> <i>Siglophora sanguinolenta</i> <i>Simplicia niphona</i>	큰诮노랑밤나방 황색검은점띠밤나방 작은갈고리밤나방 붉은갈고리밤나방 모진밤나방 흰띠꼬마밤나방 흰무늬꼬마밤나방 백운꼬마밤나방 노랑꼬마밤나방 검은띠꼬마밤나방 별빛이빨름나방 오무늬빨름나방 빨빨름나방 한줄빨름나방 검은빨빨름나방 신그물무늬빨름나방 세줄빨무늬빨름나방 연무늬빨빨름나방 술벼침나방 잔풀결수염나방 한점보라수염나방 포머보라빨름나방 담흑꼬마빨름나방 나무질밤나방 필혹점포마밤나방 점분홍꼬마밤나방 벼금무늬밤나방 작갈금무늬밤나방 온무늬갈고리밤나방 화록색밤나방 일본두출밤나방 별강나방 성줄푸른밤나방 줄꼬마수염나방 두점빨름나방 꽃노랑열름나방 기생얼룩나방 알락무늬수염나방 벼밤나방 각시보라밤나방 붉은무늬갈색밤나방 곧은미수염나방	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Appendix 1. Continued

Families	Scientific name	Species	2016						2012 ^{a,b,c,d,e,f}							
			S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6		
Noctuidae	밤나방과	<i>Simplexia rectalis</i> <i>Sineugrapha bipartita</i> <i>Sineugrapha exusta</i> <i>Sineugrapha oceanica</i> <i>Sphragifera biplagiata</i> <i>Spirama helicina</i> <i>Spirama retorta</i> <i>Spodoptera depravata</i> <i>Spodoptera exigua</i> <i>Spodoptera litura</i> <i>Spodoptera pecten</i> <i>Stenoprena nigripunctata</i> <i>Stenoloba clara</i> <i>Synpniodes picta</i> <i>Trachea atriplicis</i> <i>Trichoplusia ni</i> <i>Trotossema sordidum</i> <i>Virgo datanidia</i> <i>Xestia c-nigrum</i> <i>Zanclognatha fumosa</i> <i>Zanclognatha helva</i> <i>Zanclognatha leechi</i> <i>Zanclognatha lunalis</i> <i>Zanclognatha stramentacealis</i> <i>Zanclognatha sugii</i> <i>Aglaeomorpha histrio</i> <i>Agrisius fuliginosus</i> <i>Asuridia carnipecta</i> <i>Chionarctia nivea</i> <i>Cyana hamata</i> <i>Eilema griseola</i> <i>Eilema japonica</i> <i>Eilema nankingica</i> <i>Hyphania cunea</i> <i>Lithosia quadra</i> <i>Miltochrista aberrans</i> <i>Miltochrista miniatia</i> <i>Miltochrista pallida</i> <i>Miltochrista striata</i> <i>Miltochrista ziczac</i> <i>Paraona staudingeri</i>	알풀온수연나방 담색성검은밤나방 성검은밤나방 물결성검은밤나방 꼬마봉인밤나방 톱니백국나방 태극나방 잔디밤나방 파ーム나방 담배거제미나방 남방벗색수염방나방 민무늬노랑수염나방 포마이끼밤나방 화줄衫은잎밤나방 해밀거제미나방 양예추은무늬밤나방 총체수염나방 뾰족밤나방 서자무늬거세미밤나방 앞노랑점밤나방 자옥수연나방 노랑수연나방 리치수연나방 후수연나방 뒷밝은줄무늬수염나방 끌점축수연나방 흰무늬왕불나방 접박이불나방 눈무늬점불나방 흰체비불나방 붉은줄불나방 노랑띠불나방 간시불나방 앞노랑불나방 마운회불나방 낙점박이불나방 고치무늬주홍테불나방 주홍테불나방 노랑불나방 홍줄불나방 톱날무늬노랑불나방 목도리불나방	-	-	-	-	-	-	-	-	-	-	-	-	-
Arctiidae	불나방과															

Appendix 1. Continued

Families	Scientific name	2016						2012 ^{a,b,c,d,e,f}						2005 ^g
		S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6	
Arctiidae	불나방과	<i>Parasiccia altaica</i> <i>Rhypaiooides amurensis</i> <i>Rhypaiooides subvaius</i> <i>Spilarctia luteum</i> <i>Spilarctia seriatopunctata</i> <i>Spilosoma subcarnea</i> <i>Spilosoma imparilis</i> <i>Spilosoma lubricipeda</i> <i>Spilosoma punctaria</i> <i>Stigmatophora flava</i> <i>Stigmatophora leucirita</i> <i>Habroyne aurorina</i> <i>Habroyne pyritoidea</i> <i>Tethea albicostata</i> <i>Tethea ampliata</i> <i>Tethea consimilis</i> <i>Tethea octogesima</i> <i>Thyatira batis</i> <i>Brachmia modicella</i> <i>Chorivalva bisaccula</i> <i>Chorivalva grandialata</i> <i>Dichomeris lespedezae</i> <i>Dichomeris rasilella</i> <i>Dichomeris strictella</i> <i>Dichomeris ustalella</i> <i>Hypatima excellella</i> <i>Hypatima obscurella</i> <i>Teleiodes yanangensis</i> <i>Tephusa argobathra</i> <i>Tornodoxa longiella</i> <i>Halolaguna sublaxata</i> <i>Odites xenophaea</i> <i>Actias artemis</i> <i>Actias gnoma</i> <i>Antheraea yamamai</i> <i>Samia cynthia</i> <i>Dendrolimus spectabilis</i> <i>Malacosoma neustria</i> <i>Odonestis pruni</i> <i>Paralebeda plagiata</i> <i>Epiplena moza</i> <i>Epiplena plagiata</i>	-	-	-	-	-	-	-	-	-	-	-	-
Thyatiridae	뾰족날개나방과													
Gelechiidae	뿔나방과													
Lecithoceridae	뿔나방불이과													
Saturniidae	산누에나방과													
Lasiocampidae	솔나방과													
Epiplemidae	상꼬리나방과													

Appendix 1. Continued

Families	Scientific name	Species	2016						2012 ^{a,b,c,d,e,f}						2005 ^a
			S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6	
Limacodidae	책기나방과	<i>Belliopa horrida</i>	글검은색기나방	-	-	-	-	-	-	-	-	-	-	-	2
		<i>Latoia consocia</i>	청수색기나방	-	-	1	-	-	-	1	-	-	3	1	1
		<i>Latoia sinica</i>	꽃검은푸른색기나방	2	2	-	-	1	-	1	-	2	5	5	5
		<i>Microleon longipalpis</i>	포마磋商기나방	-	1	-	-	-	-	-	-	-	-	13	1
		<i>Monema flavescens</i>	노랑磋商기나방	2	2	1	-	-	-	2	2	5	5	1	1
		<i>Narosa fulgens</i>	꼬마얼룩무늬磋商기나방	1	2	3	-	-	-	2	2	5	5	1	1
		<i>Philosse conjuncta</i>	남방磋商기나방	-	1	-	-	-	-	1	1	5	5	3	3
		<i>Phrixolepia sericea</i>	흑색무늬磋商기나방	-	-	-	-	-	-	-	-	-	-	3	3
		<i>Rhamnosa angulata</i>	침색기나방	2	2	2	2	2	2	2	2	2	2	-	-
		<i>Thosea sinensis coreana</i>	극동磋商기나방	2	2	1	3	2	1	3	2	5	5	1	1
		<i>Chalcis remota</i>	두현미암란나방	-	-	-	-	-	-	1	1	7	7	4	4
		<i>Pidorus glaukopis</i>	흔미암란나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Pryeria sinica</i>	노랑털암란나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Amata germana</i>	노랑에기나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Brahmaea certhia</i>	왕물결나방	2	-	-	-	-	-	-	-	-	-	-	-
		<i>Acria ceramitis</i>	우뚝날개원뿔나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Cryptolechia malacobrysra</i>	길색띠원뿔나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Periacma delegata</i>	노랑날개원뿔나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Promalactis odaiensis</i>	솔파원뿔나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Promalactis suzukiella</i>	구슬무늬원뿔나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Tyrolimnas anthraconea</i>	애기원뿔나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Nokona permix</i>	배노랑죽유리나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Acleris affinatana</i>	상수리앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Adoxophyes orana</i>	애묘무늬앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Ancylis uncella</i>	뾰족날개애기앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Archips ingentanus</i>	위사과앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Archips semistriatus</i>	밀가앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Argyrotaenia congruentana</i>	반달무늬앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Bactra furfurana</i>	속애기앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Clepsis rurinana</i>	반백앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Endothenia bananusopis</i>	한글애기앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Endothenia remigera</i>	검정애기앞발이나방	1	-	-	-	-	-	-	-	-	5	5	-
		<i>Epinema foenella</i>	한갈퀴애기앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Epinotia bicolor</i>	노랑줄애기앞발이나방	-	-	-	-	-	-	-	-	-	1	1	-
		<i>Epinotia rubiginosana koraiensis</i>	짓애기앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Eubrochoneura altissima</i>	흑색꼬마애기앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Eucosma catharaspis</i>	갈색애기앞발이나방	1	-	-	-	-	-	-	-	-	1	1	-
		<i>Fulcrifera orientis</i>	오리엔트애기앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Gnorismoneura hoshinoi</i>	꼬마무늬앞발이나방	-	-	-	-	-	-	-	-	-	-	-	-
		<i>Grapholita delineana</i>	비줄애기앞발이나방	-	-	-	-	-	-	-	-	-	1	1	-
		<i>Hedya auricristana</i>	괴불왕애기앞발이나방	-	-	-	-	-	-	-	-	-	1	1	-
		<i>Hedya walsinghami</i>	장미애기앞발이나방	-	-	-	-	-	-	-	-	-	2	2	-

Appendix 1. Continued

Families	Scientific name	Species	2016						2012 ^{a,b,c,d,e,f}						2005 ^g	
			S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6		
Tortricidae	잎말이나방과	<i>Homona issikii</i> <i>Homona magnanima</i> <i>Hoshinoia longicellana</i> <i>Hystrichosolus spathanum</i> <i>Meganola costalis</i> <i>Olethreutes orthocosma</i> <i>Pandemis corytana</i> <i>Pseudacrotica hapalaspis</i> <i>Pseudohedyra retracta</i> <i>Spilonota semirufana</i> <i>Stenbermannia albomaculalis</i> <i>Abraxas latifasciata</i> <i>Abraxas niphonica</i> <i>Agathia carissima</i> <i>Agathia visenda</i> <i>Alicis angulifera</i> <i>Amraica superans</i> <i>Angerona prunaria</i> <i>Apopestelia chlorophnoides</i> <i>Archichanna melanaria</i> <i>Ascotis imparata</i> <i>Ascotis selenaria</i> <i>Biston regalis</i> <i>Bizia aexaria</i> <i>Bizia altera</i> <i>Calleulype whitelyi</i> <i>Chariaspilates formosaria</i> <i>Chiasmia cinerearia</i> <i>Chiasmia definitaria</i> <i>Chiasmia hebesata</i> <i>Chirosisa oblitterata</i> <i>Chloromachia infracta</i> <i>Cleora repulsaria</i> <i>Comibaena amoenaaria</i> <i>Comibaena argentataria</i> <i>Comibaena delicatior</i> <i>Comibaena procumbaria</i> <i>Comibaena tenuisaria</i> <i>Comostola subtilaria</i> <i>Corymica specularia</i> <i>Cotta incongruaria</i> <i>Ctenognophos grandinaria</i>	상나무 잎말이나방 치잎말이나방 사과잎말이나방 무늬찰나무에기잎말이나방 앞집은혹나방 노랑무늬에기잎말이나방 치악잎말이나방 산딸기에기잎말이나방 왕골빛에기잎말이나방 고동색에기잎말이나방 한조노랑젤름나방 천박상설록가지나방 각시얼룩가지나방 검띠푸른자나방 검띠발푸른자나방 털빨가지나방 노박덩굴가지나방 오앗나무가지나방 풀희색붉은가지나방 롯노랑점가지나방 남방비단숙가지나방 네눈수기지나방 불희색기지나방 풀갈색기지나방 코끌갈색기지나방 뒷노랑흰풀걸자나방 온줄가지나방 줄마다가지나방 두줄점가지나방 세줄점가지나방 애기푸른자나방 한애기푸른자나방 굵은줄가지나방 네점푸른자나방 성눈푸른자나방 붉은푸른자나방 무늬박이푸른자나방 큰무늬박이푸른자나방 애기네눈박이푸른자나방 큰노랑에기자나방 연노랑제줄가지나방 세줄노랑가지나방	-	-	-	-	-	-	-	-	-	-	-	-	1
Geometridae	자나방과															

Appendix 1. Continued

Families	Scientific name	Species	2016						2012 ^{a,b,c,d,e,f}						2005 ^a	
			S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6		
Geometridae	자나방과	<i>Culcula panterinaria</i> <i>Deilephilia rebeata</i> <i>Dilophodes parvularia</i> <i>Dindica virescens</i> <i>Diplodessma ussurianaria</i> <i>Duliophyle agitata</i> <i>Duliophyle majuscularia</i> <i>Ecliptopera umbrosaria</i> <i>Ectecephrina semiliutea</i> <i>Ectropis aligneri</i> <i>Ectropis crepuscularia</i> <i>Ectropis excellens</i> <i>Eilicrinia paryula</i> <i>Eupithecia tabidaria</i> <i>Eustroma aerosum</i> <i>Evecliptopera decurrents</i> <i>Fascellina chromataria</i> <i>Gandaritis agnes</i> <i>Gandaritis fixseni</i> <i>Gelasma grandifilaria</i> <i>Geometra dieckmanni</i> <i>Geometra glaucaaria</i> <i>Gymnoscelis esakii</i> <i>Hemistola veneta</i> <i>Hemithea aestivaria</i> <i>Heterolocha aristonaria</i> <i>Heterolocha laminationaria</i> <i>Heterostegane hyriaria</i> <i>Hyperphrya terrosa</i> <i>Hyperreia parva</i> <i>Hypomecis punctinalis</i> <i>Hypomecis roboraria</i> <i>Ideaa auricruda</i> <i>Ideaa muricata</i> <i>Ideaa nielseni</i> <i>Idiotephria amelia</i> <i>Jankowskia fuscaria</i> <i>Jankowskia pseudathleta</i> <i>Jodis angulata</i> <i>Jodis putata</i> <i>Leptostegna tenerata</i> <i>Lomographa subspersata</i>	노랑띠일락가지나방 술집은가지나방 베텔가지나방 각시자나방 두줄풀푸른자나방 넓은бир근가지나방 누린큰가지나방 큰톱날풀결자나방 내줄점가지나방 연회색가지나방 날개풀결자나방 줄고운가지나방 노랑재무늬가지나방 배노랑풀결자나방 노랑그물풀결자나방 한그물풀결자나방 길고리가지나방 회색풀결자나방 큰노랑풀결자나방 큰제비풀결자나방 한줄풀결자나방 쌍줄풀결자나방 끌빨족적풀결자나방 한애기연포른자나방 붉은산두리풀결자나방 꽃분홍가지나방 꼬마노랑가지나방 네무늬가지나방 뒷노랑뾰족가지나방 애기줄가지나방 네눈자나방 세줄날개가지나방 줄굵은애기자나방 분홍애기자나방 꼬마분홍애기자나방 노랑무늬풀결자나방 줄구름무늬가지나방 복방구름무늬가지나방 애기기생포른자나방 기생포른자나방 푸른풀결자나방 두줄흰가지나방	-	-	2	-	-	2	4	-	-	-	-	-	1

Appendix 1. Continued

Families	Scientific name	Species	2016						2012 ^{a,b,c,d,e,f}						2005 ^g		
			S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6			
Geometridae	자나방과	<i>Menophra senilis</i> <i>Microcarfiera obscura</i> <i>Microlygris complicata</i> <i>Neohipparchus vallata</i> <i>Ninodes splendens</i> <i>Nothoniza aureolaria</i> <i>Obeidia tigrata</i> <i>Ochrognesia difficta</i> <i>Odontoptera arida</i> <i>Ophthalmimitis albosignaria</i> <i>Ouraapteryx maculicaudaria</i> <i>Ouraapteryx nivea</i> <i>Ouraapteryx persica</i> <i>Pachyligia dolosa</i> <i>Parabapta clarissa</i> <i>Pareclipsis gracilis</i> <i>Parectropis extersaria</i> <i>Percnia albinigrata</i> <i>Phthonosema tendinosaria</i> <i>Pingasa pseudoterpnaaria</i> <i>Plagodis pulveraria</i> <i>Pogonopygia nigralbata</i> <i>Polymixinia appostaria</i> <i>Prolepsis diazoma</i> <i>Prolepsis euircota</i> <i>Prolepsis plagiata</i> <i>Prolepsis superans</i> <i>Proboscarmia simplicaria</i> <i>Pylargosceles steganioides</i> <i>Racotis boarmiaria</i> <i>Racotis petrosa</i> <i>Rikiosato grisea</i> <i>Scopula emissaria</i> <i>Scopula floslactata</i> <i>Scopula ignobilis</i> <i>Scopula nigropunctata</i> <i>Scopula semignobilis</i> <i>Scopula superior</i> <i>Somatina indicataria</i> <i>Tanaorhinus reciprocata</i> <i>Tephritis vapulata</i> <i>Thetidia albocostaria</i>	먼그립기자나방 성무늬풀걸자나방 큰애기풀걸자나방 붉은풀풀른자나방 보라애기자나방 앞노랑가자나방 노랑날개무늬가자나방 왕무늬풀자나방 남방갈고리가자나방 큰눈노랑가자나방 흰체비기자나방 연노랑체비기자나방 垢은풀체비기자나방 꽃흰가자나방 연푸른기자나방 끌꼴루노랑가자나방 한무늬노랑가자나방 알란흰가자나방 뿔무늬큰가자나방 날개등근풀자나방 미넓은기자나방 섬알란흰가자나방 담혹가자나방 내눈은윗애기자나방 큰눈흰애기자나방 점줄흰애기자나방 왕눈큰애기자나방 꽝나무가자나방 끌무늬애기자나방 남방풀걸기자나방 침풀걸기자나방 두줄기자나방 포마첨黜흰애기자나방 풀걸큰애기자나방 넉풀걸애기자나방 앞노랑애기자나방 줄무늬애기자나방 줄노랑흰애기자나방 구름무늬흰애기자나방 갈고리왕풀론자나방 취빛기자나방 내눈밖이푸른자나방	-	3	2	1	2	2	1	3	-	1	1	1	1	5

Appendix 1. Continued

Families	Scientific name	Species	2016						2012 ^{a,b,c,d,e,f}					
			S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6
Geometridae	자나방과	<i>Thinopteryx crocoptera</i> <i>Timandra apicrosea</i> <i>Timandra comptaria</i> <i>Timandra dichela</i> <i>Timandra griseata</i> <i>Xandrames dholaria</i> <i>Xanthorhoe hortensiaria</i> <i>Zancloidea testacea</i>	일란재비기자나방 붉은흉띠에기자나방 홍띠에기자나방 큰흉띠에기자나방 붉은날개에기자나방 흰띠왕기자나방 두줄물결자나방	-	-	-	-	-	1	1	-	-	-	1
Notodontidae	재주나방과	<i>Clostera anachoreta</i> <i>Drymonia dodonides</i> <i>Duduza sphigiformis</i> <i>Eguria ornata</i> <i>Fentonia ocyptete</i> <i>Gangarides dharma</i> <i>Harpyia umbrosa</i> <i>Hexafrenum leucodera</i> <i>Lophantosia cucullus</i> <i>Narracoides basinotata</i> <i>Neodrymonia coreana</i> <i>Neodrymonia marginalis</i> <i>Neostauropus basalis</i> <i>Nerice davidi</i> <i>Peridea elizet</i> <i>Peridea gigantea</i> <i>Peridea lativitta</i> <i>Peridea obertueri</i> <i>Phalera assimilis</i> <i>Phalera flavesrens</i> <i>Phalera minor</i> <i>Phalera sangana</i> <i>Pterostoma sinicum</i> <i>Quadricalcarifera cyanea</i> <i>Quadricalcarifera pyreli</i> <i>Rabitala cristata</i> <i>Spatialia doerriesi</i> <i>Uropyia meticulodina</i> <i>Wilemannia bidentata</i> <i>Epicoeia menciana</i> <i>Eumeta japonica</i> <i>Eumeta minuscula</i>	노랑얼룩풀찰름가자나방 꼬마버들재주나방 벼들재주나방 천출재주나방 꽃술재주나방 각시재주나방 밤나무재주나방 길고리재주나방 은재주나방 끌흰재주나방 높은산재주나방 침모늬재주나방 고려재주나방 뿔죽날개재주나방 꽃무늬재주나방 벗챙이재주나방 노고지리재주나방 곧은줄재주나방 긴날개재주나방 오리나무재주나방 침나무재주나방 백무늬재주나방 붉은머리재주나방 배얼룩재주나방 매죽나무재주나방 회색재주나방 여갈색재주나방 곱추재주나방 온무늬재주나방 기생재주나방 백무늬은재주나방 두줄재비나비불이 남방자주머니나방 치주머니나방	-	-	-	-	-	1	1	8	3	-	1

Appendix 1. Continued

Families	Scientific name	Species	2016						2012 ^{a,b,c,d,e,f}			2005 ^g		
			S1	S2	S3	S4	S5	S6	-	-	-			
Yponomeutidae	집나방과	<i>Yponomeuta tokyoneillus</i> <i>Ypsolopha blandellus</i> <i>Ypsolopha strigosus</i>	침엽실집나방 길고리집나방 한줄집나방	-	-	-	-	-	-	-	-	42		
Thyrididae	창나방과	<i>Rhodoneura erecta</i> <i>Rhodoneura shini</i> <i>Rhodoneura vittula</i>	포마상수리창나방 줄무늬창나방 상수리창나방	2	1	-	-	-	1	1	1	2		
Crambidae	포충나방과	<i>Striglina cancellata</i> <i>Striglina venia</i> <i>Agroterae nemoralis</i> <i>Anaithes maculalis</i> <i>Anaithes semirritalis</i> <i>Anania verbasalis</i> <i>Ancylolomia japonica</i> <i>Botyodes apicalis</i> <i>Botyodes dinisialis</i> <i>Botyodes principalis</i> <i>Bradina atopalis</i> <i>Bradina geminalis</i> <i>Calamotropha okanoi</i> <i>Calamotropha paludella</i> <i>Chabula onychinalis</i> <i>Chabula telphusalis</i> <i>Chilo suppressalis</i> <i>Cirrhochrista brizoalis</i> <i>Cnaphalocrocis stereogona</i> <i>Conogathes punctiferalis</i> <i>Cotachena alysoni</i> <i>Cotachena pubescens</i> <i>Diasemina accalis</i> <i>Elophila (Cyrtogramme) turbata</i> <i>Elophila (Elophila) interruptalis</i> <i>Eurrhyparodes accessalis</i> <i>Eurrhyparodes contortalis</i> <i>Glyphodes perspectalis</i> <i>Glyphodes pyri</i> <i>Glyphodes quadrimaculalis</i> <i>Goniohyynchus butyrosa</i> <i>Goniohyynchus exemplaris</i> <i>Haritalodes derogata</i> <i>Herpetogramma fuscescens</i> <i>Herpetogramma luctuosalis</i>	체비날개들명나방 연보라들명나방 주엽나무창나방 체비날개들명나방 홀씨무늬들명나방 각시뾰족들명나방 벼포충나방 얼룩들명나방 포풀잎말이영나방 큰점노랑들명나방 흰점줄들명나방 와줄들명나방 점현포충나방 흰포충나방 점알락들명나방 큰한무늬들명나방 이화백나방 온빛들명나방 넓개검은들명나방 복승아영나방 율릉노랑들명나방 한무늬노랑들명나방 점애기들명나방 얼룩애기들명나방 연풀명나방 애기무늬들명나방 밀굽무늬들명나방 회양목명나방 단나무들명나방 코각시들명나방 남방노랑들명나방 노랑무늬들명나방 목회명나방 줄점들명나방 포도들명나방	-	-	-	-	-	-	-	-	-	-	11

Appendix 1. Continued

Families	Scientific name	Species	2016						2012 ^{a,b,c,d,e,f}						2005 ^g	
			S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6		
Crambidae	포충나방과	<i>Herpetogramma rufidis</i> <i>Metachrostomus flavofascialis</i> <i>Miyakea expansa</i> <i>Mutuaria terrealis</i> <i>Nacoleia commixta</i> <i>Nacoleia sibirialis</i> <i>Nomophila noctuella</i> <i>Nymphicula saigusa</i> <i>Omiodes noctescens</i> <i>Omiodes tristrialis</i> <i>Ostrinia furnacalis</i> <i>Ostrinia orientalis</i> <i>Ostrinia palustralis memnialis</i> <i>Ostrinia scapulalis</i> <i>Ostrinia zuguliaevi</i> <i>Paliga auratalis</i> <i>Palpita inositata</i> <i>Palpita nigropunctalis</i> <i>Parapoynx vittalis</i> <i>Patissa fulvosparsa</i> <i>Piletocera sodalis</i> <i>Pleuroptya batteaya</i> <i>Pleuroptya chlorophanta</i> <i>Pleuroptya punctimarginalis</i> <i>Pleuroptya quadrimaculalis</i> <i>Polythlipta liquidalis</i> <i>Pseudargyria interruptella</i> <i>Pseudocatharylla simplex</i> <i>Pycnarmon cibrata</i> <i>Pycnarmon pantherata</i> <i>Pygospila tylostegealis</i> <i>Pyrausta mutuurai</i> <i>Pyrausta unipunctata</i> <i>Rehimena phrynealis</i> <i>Rehimena surusalis</i> <i>Scirpophaga virginia</i> <i>Sinomphisa plagialis</i> <i>Sitochroa recurvalis</i>	아노랑무늬들머나방 청갈박이 벼 먹나방 코칠점박이포충나방 노은산들머나방 얼룩애기들머나방 가루뿌린들머나방 동심무늬들머나방 윗무늬노랑물머나방 노랑다리들머나방 흰다리들머나방 조령나방 오리엔트조령나방 부홍무늬들머나방 궁줄기 먹나방 큰섬들먹나방 금빛재줄들먹나방 에기원들먹나방 수수꽃다리먹나방 애벌풀들먹나방 알락간날개먹나방 콩풀무늬들먹나방 갈참나무먹나방 굼노랑들먹나방 장미색들먹나방 가두리들먹나방 비단들먹나방 신미들먹나방 줄은빛포충나방 은빛포충나방 크리비들먹나방 풀무늬들먹나방 구름무늬들먹나방 큰알락들먹나방 진도들먹나방 앞모늬들먹나방 아노랑검은들먹나방 천노랑들먹나방 은빛간날개먹나방 개오동먹나방 흰띠먹나방	-	-	-	-	-	-	-	-	-	-	-	-	1
			-	-	-	-	-	-	-	-	-	-	-	-	-	

Appendix 1. Continued

Families	Scientific name	2016						2012 ^{a,b,c,d,e,f}			2005 ^g
		S1	S2	S3	S4	S5	S6	S1	S2	S3	
Crambidae	포충나방과	<i>Syllepte invalidalis</i> <i>Syllepte pallidinotata</i> <i>Syllepte segnalis</i>	큰얼무늬들명나방 연무늬들명나방 달무늬들명나방	-	-	-	-	-	-	-	2
		<i>Syllepte taiwanalis</i>	대만들명나방	-	-	-	-	-	-	1	1
		<i>Tyspanodes hypsalis</i>	줄검은들명나방	3	3	4	-	3	2	3	-
		<i>Tyspanodes striata</i>	꽃날개들명나방	3	3	-	-	-	-	-	-
		<i>Mimerastria mandschuriana</i>	사과혹나방	-	-	-	-	-	-	-	1
Nolidae	혹나방과										

S1, Geubchisan; S2, Jiryeoksan; S3, Cheondungsan; S4, Cheomchalsan-2; S5, Cheomchalsan-1; S6, Godusan.
^aNational Institute of Environmental Research, 2012a. The 3rd National Ecosystem Survey-Gasa (346091) [CD-Rom] (in Korean).
^bNational Institute of Environmental Research, 2012b. The 3rd National Ecosystem Survey-Jinjo (346101) [CD-Rom] (in Korean).
^cNational Institute of Environmental Research, 2012c. The 3rd National Ecosystem Survey-Jisan (346092) [CD-Rom] (in Korean).
^dNational Institute of Environmental Research, 2012d. The 3rd National Ecosystem Survey-Munnae (346063) [CD-Rom] (in Korean).
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