IJBPAS, December, 2015, 4(12), Special Issue: 636-647

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

IDENTIFICATION OF THE HOSTING RANGE OF SEED-EATING INSECTS OF NEOROPTERA (COLEOPTERA) ORDER IN LORESTAN PASTURES

FATEMEH PIROZI[1], JAVAD SOOSANI[2], HASAN MOKHTARPOUR[3]

1-Natural Resources Research Department, Lorestan Agricultural and Natural Resources Research and Education Center, AREEO, Khoramabad, Iran, pirozi9@yahoo.com

2-Forestry department, Agriculture Faculty, Lorestan University; Soosani.j@LU.ac.ir

3-Crop Production and Physiology Department, Golestan Agricultural and Natural Resources Research Center , AREEO, Gorgan- Iran; okhtarpour2009@yahoo.com

ABSTRACT

Unfortunately, the pasture plants are decreasing every day due to various factors such as inordinate grazing, high aggregation of livestock, pastures firing, excessive rainfalls in the form of flood and drought in some areas, and also excessive exploitation of plants in original habitats. In the other hand, the research findings show that different species of insects including Neoroptera (Coleoptera) order feed from pasture plants seeds and prevent them from germination and revitalization; therefore, collecting and identifying them is very important. In this study we have collected and identified the hosting range and dispersal of these insects in Lorestan pastures for one year, and totally collected 250 species of pasture plants, and separated 13 species of seed-eating Neoroptera plants which have been related to Curculionidae and Bruchidae families.

The study of results showed that the most pollution was related to Curculionidae family, which constituted amounting 70% of the insects and included nine different species, and the highest levels of the family pollution were insects of Labiaticola atricolor and Labiaticola syriacus species on Phlomis persica specie host plant. Also the lowest level of pollution was related to insect of Microlarinus rhinocylloides specie on host plant of Zygophyllaceae specie, and the highest dispersal was related to Bisheh area with geocoding of E485241, N331949in the height of 1870 meters above sea level.4 species of Neoroptera from 2 families of the area have been

identified. It should be noted that the sampling time is very important in the study, and there is a special time range for collecting each plant which should be considered.

Keywords: hosting range, seed-eating insects, pasture plants, Lorestan Province.

INTRODUCTION

Different definitions have been mentioned for pasture. According to definition of Pasture-owners Community in 1974, the word pasture refers to all lands which have natural covering so that the animal feed can be obtained from it and its revitalization occurs naturally.

We are continuously observing the reduction of different palatable pasture plants and their replacing with invasive plants of the country pastures due to many reasons, such as overgrazing and excessive utilization of the plants in main habitats, high aggregation of livestock, damages due to pests and drought occurrence in some areas. In the meantime, the damages due to seed-eating pests of the pasture plants are of the most effective factors preventing from the healthy seed production and consequently resulting in failure of the pastures dibbling plans to reform the pasture covering (7).

Therefore, identification and estimation of the pest's damages are basic for planning and sustainable management of the national capital. Pasture plants seeds which are the most important factors of the plants plethora and dispersal, attacked by seed-eating pests of different orders of insects. The difference between the levels of pest seed-eating on different species are various due to difference in phenology , chemical composition of the seeds, ecological condition of the area , as well as morphological features of fruit and of each specie(4).

Totally, many of insects have coordinated their biology or living condition with phonological condition of the host plants. Of course, the plants employ some ways to defend themselves against seed-eaters invasion. These ways include different items such as escaping the host from seed-eater pests for example those plants which have shorter growing period and are rarely attacked by seed-eater dorbeetles, or the existence of protective coating around the seed and secretion of chemicals (Allelochemicals) or both of them, and another strategy such as co-generation of seed by a specie of plant or abundant seeds which is often done with large intervals during the insect life cycle (6).

But because very little information is available regarding phenology of pasture

land, the time of seed forming in them, and the seed ripening process from the pollination time, so the exact times of collecting seeds as well as the effects of climatic conditions were taken into account in this study.

MATERIALS AND METHODS

1-First, the pastures confine of provinces where the plan employed was divided, based on Emberger geographical divisions, and totally the sampling was done from 19 stations.

2-The polluted seeds were collected from pasture plants and kept in laboratory until emergence of adult insects.

3-After collecting the seeds, some information include: insect name, date of collection, host plant features, habitat specification, exact height of collection place, and as far as possible the local name of the host plant will be recorded in special forms and one special code indicating the mentioned specification will be given to each insect.

4-after the emergence of adult insects, they were collected in tubes containing 70%alcohol and the tubes with specification were kept in laboratory.

5-The collected samples were separated in terms of order, and identified using books and scientific resources. Being transferred to laboratory, aerated and dehumidified, the samples were moved to culture containers in terms of frequency, site and plant species, and the insects coming out of seeds were collected and recorded by daily visiting.

DISCUSSION

The importance of pastures

More than half of the Iran area constitutes of pastures. Pasture is very important as the base of socio-economic evolutions of nomads and tribes as a source of meat, dairy, wool and other animal products. Also a part of the industrial and medicinal plants is obtained from this God-given resource.

Due to the increasing demand for animal products and not needing to import them, it is obvious that the livestock production should be proportionate with domestic consumption or their increasing in the coming years.

Of course, the producing cost of animal products will be minimized when the animal fed from natural resources herbs during a period of the year.

The more increasing the planting surface of provender plants and spreading the constructed pastures, the more production costs of animal products will be. The only way to decrease the costs is using the natural resources. The pastures have other values too. International computing and assessment have indicated that the value of one hectare

of the pasture per year is equivalent to $232, out of which 25% is related to provender supply , and 75% related to environmental values. In other word, Iran pastures in addition to produce 10.7 million tons provender have indirect values almost four times of this amount which are ignored in economic computation. Preventing from flood occurrence should be considered as the other role of the pastures, but unfortunately most of the country pastures has confronted with a dip crisis due to excessive destruction and is one of the important factors of destroying the pastures is seed-eating insects.

Seed-eating insects

Coleopteran order, English name: Beetles

Coleopteran order which has been explained as possessing about 400,000 species constitutes the richest order of insects. This quantity is equal to all plant species which have been known so far. One of the most obvious method of recognizing them is that their hard front wings covering the hind one. However, there are some insects of this order which do not have coleopteran and often have the abrasive mouth parts. Their transformation is complete, and the insects of this order have different types of larvae. Coleoptera live in different areas and habitats. Some of them are vegetarian, some are predator, and some are omnivore or feed from fungal materials and mildews. Insects of this order are divided into 3 sub-orders as follow:

1- Archostemata: in the people of this sub-order the toes of the front, middle, and hind legs constitute 5 knuckles, and their antennas are threadlike or rosary like. This sub-order is an elementary category whose people are very rare; also it has two families of Cupedidae and Micromaltidae.

2- Adephaga: in the people of this sub-order, the belly first ring is covered by hind leg coxa . Also they have Notopleural seam line.their toes are normally 5-5-5and the antennas are 11- knuckles and threadlike (rarely are rosary-like or clubbing).Almost in most cases, the dorbeetles of this suborder are predator. This sub-order possesses the families such as Carabidae, Rhysodidae, Cicindellidae, Halipidae, Dytiscidae, Noteridae,and Gyrinidae.

3- Polyphaga: in the people of this sub-order, the first belly ring is not covered by hint leg coxa, and the hint ledge of belly first ring stretches across belly width and is visible. The chest rings are nearly without Notopleural seam line in most cases.This sub-order possesses the families such as Histeridae, Hydrophilidae, Staphylinidae , Dermastidae, Elateridae, Buprestidae, Coccinellidae,etc.(9)

The most important pasture plants families which were collected in this study include: Plantaginaceae, Caryophyllaceae, Polygonaceae, Umbelliferae, Scrophulariaceae, Chenopodiaceae, Rosaceae, Lamiaceae,and Compositae, some of which were polluted by seed-eating pests.

RESULTS

According to statistics, the range of Iran pastures is more than 86.1 million hectares which covers 53% of the country surface, out of which 1.9 million hectares are related to Lorestan Province wooded and non-wooded pastures. Unfortunately because of different factors such as overgrazing , high aggregation of livestock ,pastures firing, excessive rainfall as floods, drought in some areas, as well as excessive use of plants in the main habitats , we are visiting the decreasing of palatable plants and replacing them by invasive pasture plants every day. On the other hand, researches and assessments done show that different species of insects feed from the seeds of pasture plants specially palatable provender one, and prevent from germination, revitalization, reproduction, and establishment of the plant in their natural habitats. Therefore, the collection and identification of these factors will be very important.

In this research, we have studied the seed-eating pests which are one of the pasture destruction factors in order to employ proper management to eliminate the destruction factors and provide the appropriate ground for restoration of damaged pastures.

Introduction of studied plant species

Umbelliferae family

The family consists of annual or perennial plants, rarely bushy or shrubby (such as Pycnocycla in Iran). Bearings are spotty, rarely opposite or accumulated, normally without stipule, simple to several times divided, with or without thistle, odd-pinnate to multi-pinnate, petioles are often grown and pod –formed.

Inflorescence is usually compound pileum (each initial radius or peduncle ended to an umbelet of which radiuses or peduncles named secondary radiuses), or simple pileum (peduncle named initial radius in this case, for example in Dorema) or Sarsan (for example Pycnocycla, and Eryngium). Bract or bracteole exist or do not exist,simple or divided(pinnatisect), Flowers are on the ovaries (hypogynous), hermaphrodite or monophrodite(rarely Dioecious such as Trinia), leaflet exist or does not exist, sometimes disparate.5-pieces petals are mostly 2-parts at the end with backed(curved)tip, all are of equal size, or

outward ones are greater the inward ones(so called Radiant) in white, yellow, luteous, blue, or purple colors. 5-pieces stamens are spotty with petals. Hypogynous,- bijugate, bicarpellary, double-styled, normally with great base called style pedicle(Stylopodium).fruit is generally dry , composed of (1): tow non-flourished back-pressed , side –pressed , or cylindrical carpels which are separated by a board or narrow plate(Commissure), Glabrous or downy, covered with scales, warts (small swollen organs), beard, or thorn. Carpells arenormally stick to a simple or divided pivot called Carpophor and separated from each other when the fruits ripped. This plant family is very wide in Iran and has about 114 genera and 420 species

Lamiaceae family

often with Annual or roughage plants, rarely shrubby, often fragrant without spines with a stem that is often quadric . The leaves are opposite or accumulated next to each other and sometimes are also like spicate inflorescence. Other flowers are female, in this case the flowers are smaller and paler then the rest such as Mentha, Nepeta,and Ziziphora genus. Bracts are clearly recognizable from leaves. Bracteoles are possibly next to each flower. The calyx consists of gamosepalouses normally having 5 lobes or indents-three up, tow down(of Nepeta genus) or for 1 and 4, a dent in the top four at the bottom (Ocimum),or 1 and 1(Scutellaria) or nearly regular (Stachys) .20-50 streaks exist on the calyxes of different genus.The corolla is consistent and irregular , with tube-formed base , consists of two specified lips above include upper and lower one. The upper one consists of 2 carved or straight, or more or less convex parts, and the lower part consists of 3 parts. Some flowers also have exceptional cases. For example in Teucrium genus the upper lip is scaled down and there is only the lower 5-parts lip.

In Ajuge genus, the upper lip is very small and unspecified and the lower lip is possibly regular with 4 parts. The stamens are quadric and connected to corolla, tow by tow are equal, or two of them ore scaled down and unproductive, in which case called Staminod, the length of 2 upper staminas are normally different from the 2 lower ones and connected to each other by a long connective. The upper ovary has two double-styled carpels, each style has one ovum. The stigma comes out of carpels base (Gynobasic), or rarely comes out of upper parts of carpels (like Ajuga genus).The fruit has four nutlets (8). This family consists of about 220 genus and 3500 species of plants (5).

Dipsacaceae family

The family consists of annual, biennial, or perennial herbaceous plant. The leaves are Opposite, without stipules, full to harp like (Lyrate) odd-pinnate, are bi-pinnate, flowers are bulk Capitulum (Capitula),having a collar under which composed of 1-2 rows of bract . Bulk Capitulum(capitula) is Often tangy, with cup-shaped calyx or divided to beard-like parts.Flower corolla is 4-5 parts, normally outward-downy, the color of flowers are white, yellow, pink, cheese-like or purple. Quadric stamens protruded from corolla. Underside overian is odd-pinnate and closed by bracteoles (Involucel) or sub-sepals (Involucel), often with ending crest or dents (8). 14 genuses have been reported From Khaje-bashi family.

Scrophulariaceae family

The family consists of annual, perennial, bushy (nemorosa) or rarely shrubby plants, independent or semi-parasite, rarely fully parasite, without chlorophyll (Lathraea). Leaves are without stipulis, spotty, opposite, or accumulated. Flowers are hermaphrodite, isolated pivotal, ear, cluster, or panicle-cyme.4-5 parts, bi-lipped or bi-lobbed (tow-parts) calyx. The corolla is gamopetalous, normally irregular or bi-lipped, sometimes bag-like or spurred base, sometimes nearly regular, Corolla lobes overlapping in bud always .inflorescence exists inside bud (Aestivation).

Stamens are corolla-connected, quadratic, tow-by-tow equal (2 are longer and 2 are shorter), or binate, rarely 5stamens, longitude bloom anther, or joined at the end, with a thoroughly blossom groove, often with many, rarely few, seeds. Mostly with different arrays (having flake with different arrays and excrement) (8).this family has about 280 genus and 3000 species (5).

Zygophyllaceae family

The family consists of herbaceous or shrubby, often fleshy or thorny plants. The leaves are opposite, simple or cut pectinated, often compound (Saepissime autem compositae), stipulis exists clearly and sometimes has turned to thorn. Flowers are regular, bisexual, quadric or pentavalent. Sepals are permanent and not-falling. Often ungula petals exist. Staminas are equal or two times of petals quantity, rarely too many, Stamen stems have small scales on back surface (in Nitraria and Peganumgenuses).The ovary is simple, having short tray, 4-5 lobes, 4-5 pinnated. 2 (rarely more) or multiple, numerous and dangle ovules exist in any pinnate.

Stigma is simple and rarely divided. One style, rarely 4-5 pieces, exists. Fruit is often dry and capsule-like, rarely un-blossom and

fleshy (drupe like).The seeds are endospermic or without endosperm (8).

Samples collected from Coleoptera in the study Curculionidae (Snout beetles) family

Curculionidae family is a very large and important family of beetles .The most quantity of species (about 5000) are related to Coleoptera (Csoka 1999 Kovacs) respectively and called Snout beetles, completely phyllophagous with a wide range of life history and morphology (of Csoka 1999 and Kovacs) .

Many species dig tunnels named gallery in trees bark. In some adults cases, matting room and saving eggs, especially in gallery have been created. Then, larvae feeding in certain species would be done from the gallery. The size and shape of gallery can specify the success of beetle specie (Csoka 1999, Kovacs).

This family consists of beetle from sub-family of (Scolytinae). This separate family has been identified about 50 years ago. Bark beetle or Sphenoptera kambyses has significant economic impact on tens of thousands of hectares of Bisheh (Csoka 1999 and Scolytus scolytus). Dutch elm disease agent belongs to this family (1).

Identified subfamilies of Curculionidae family

Beetle subfamily: Curculioninae-a part of snoute family consists of 23500 species of 2200 genus, so has been known as the greatest subfamily of curculionem. Regarding that the beetles(Coleoptera) included in a quarter of all living organisms, Curculioninae are one of the most successful of them in terms of expansion, and most of them has been known as flower and fruit curculionems feeding from reproductive organs of plant(2).

Mecinini phylum

1- **Niloticum Gymnetron** specie which has been collected from Sheikh Miri area with Geographical coordinates of "33 ' 54°33 "01 '41 ° in the height of 2130 meters above sea level from the Veronica orientalisplant of Scrophulariaceae family.

2- **Mecinus Labilis** specie which has been collected from Darreh Takht area with Geographical coordinates of "24 '18 °33 "53 '25 °49, in the height of 2129 meters above sea level from Verbascum assurense plant of Scrophulariaceae family.

3- **Rhinusa Neta** specie which has been collected from Sarvand area with Geographical coordinates of '59 °48 "91 '58 °33 "29 in the height of 2200 meters above sea level from

Verbascum assurenseplant of Scrophulariaceae family.

Baridinae subfamily

The subfamily is from real curculionem(*Curculionidae) , 43 species from 550 genus of which has been introduced by* Schönherr in 1836 .*The subfamilies are the most important pests compared to other pests in terms of economic. Also a few species of them are at risk (3).*

1- Labiaticola syriacus+despicatus+araxicola specie which has been collected from Bisheh area with Geographical coordinates of ‘40 ° "76 '29 °33 "14in the height of 1870 meters *above the sea level from* Phlomis persica host plant of Lamiaceae family.

2-1844, Labiaticola atricolor Boheman specie which has been collected from Bisheh area with Geographical coordinates of ‘40 °48 "76 '29 °33 "14 in the height of 1870 meters *above the sea level from* Phlomis persica host plant of Lamiaceae family.

3-Labiaticola araxicola+syriacu specie which has been collected from Bisheh area with Geographical coordinates of "14 '40 °48 "76 '29 °33 in the height of 1870 meters *above the sea level from* Phlomis olivieri Benth host plant of Dipsacaceaefamily.

4- Labiaticola atricolor Boheman, 1844specie which has been collected from Absefid area with Geographical coordinates of '35 °48 "52 '50 °33"98 in the height of 2281 meters *above the sea level from* Pterocephalus canus host plant of Dipsacaceaefamily.

5- Labiaticola araxicola Reitter, 1895specie which has been collected from Zagheh area with Geographical coordinates of ‘40 °48 "76 '29 °33"14 in the height of 2020 meters *above the sea level from* Pterocephalus canus host plant of Lamiaceaefamily.

Lixinae subfamily

Lixinae is a subfamily of curculionem , some of their species such as Centaurea specie has been also seen in flower root and sprout. Some species of them are used in biological control of invasive weeds. This subfamily has three phylums , the greatest of which is Cleonini phylum which sometimes introduced as an independent subfamily.

Lixiniphylum

1- Microlarinus rhinocylloides Hochhuth, 1847specie which has been collected from Ghalaei area with Geographical coordinates of "12 '49 °33 "16 '55 °47 in the height of 1384 meters *above the sea level from* Tribulus terrestris host plant of Zygophyllaceae.Family

Family (Bruchidae (Lariidae)

The family consists of more than 1200 specie , and the larvae of these insects live in Leguminosae seeds and causes many damages to peas, beans, and the like(4).

Samples collected from Bruchidaein the study

Bruchinaesubfamily

1- **Atricolor Bruchidius** specie which has been collected fromm Bisheh area with geographical coordinates of ‘37 °48 "25 '27 °33"80 in the height of 1870 meters above the sea level from Phlomis persica host plant of Lamiaceae family.

2- **Caryedon mesra** specie: which has been collected fromm Bisheh area with geographical coordinates of '59 °48 91 '58 °33"29in the height of 2200 meters above the sea level from Plantago lanceolata host plant of Plantaginaceae family and Prangos acaulis of Umblliferae family .

3- **Tube manquant** specie: which has been collected fromm Shirz area with geographical coordinates of ‘42 °47 "10 '47 °33"28 in the height of 1350 meters above the sea level from Eryngium thyrsoideum host plant of Umblliferae family.

CONCLUSION AND SUMMARY

In the research, the seed eating pests which are one of the destructive factors of pasture have been studied in order to employ the proper management for eliminating the destructive factors and providing the appropriate grounds for restoration of damaged pastures.

In this study we have collected and identified the hosting range and dispersal of these insects in Lorestan Pastures for one year, totally collected 250 species of pasture plants, and separated seed-eating Neoroptera 13 species of plants which have been related to Curculionidae and Bruchidae families.

The study of results showed that the most pollution was related to Curculionidae family, and the highest levels of the family pollution were insects of Labiaticola atricolor and Labiaticola syriacus species on the host plant of Phlomis persica specie from Laminacea family.

Also the lowest level of pollution was related to insect of Microlarinus rhinocylloides specie on host plant of Plantago lanceolata specie from Zygophyllaceae family, and the highest dispersal was related to Bisheh area with geocoding of E485241, N331949,and the height of 1870 meters above sea level.4 species of Neoroptera from 2 families of the area have been identified. It should be noted that the sampling time is very important in the study, so that if the samples were picked early, the pest insects would be at the larvae stage and the insect would be died with drying the plant, also if the sampling was done later than usual, the seeds of plants

would be poured and insects would came out; so there is a special time range for collecting each plant which should be considered.

REFERENCES

4- Csoka, G. Y. Kovacs, T (1999). Xylophagous insects. Bisheh Research Institute, Hungary.

5- KUSCHEL, G. (1995): A phylogenetic classification of Curculionoidea to families and subfamilies. In: ANDERSON, R.S. & LYAL, C.H.C. (EDS.): Biology and Phylogeny of Curculionoidea. Memoirs of the Entomological Society of Washington 14: 5–33.

6- Morimoto, Katsura, and Yoshihara, Kazumi. "On the Genera of the Oriental Baridinae (Coleoptera, Curculionidae)". Esakia, (36): l-59. January 31, 1996.

7- Sezen, Uzay. "Two ichneumon wasps competing to oviposit". Retrieved 12 September 2011.

8- Mikaeil Badr zadeh (2004). A review of plant categorization (Angiosperms).Amidi Press.Tabriz

9- Assadollah Hosseini .Insects and Plants (2007) .Insect Ecology Seminar. Tarbiat Modarres University.

10- Rasoul Rangavaran (2012).The study of Pasture situation changes in order to access to a proper method to identify the situation and attitude of pasture ecosystems.

11- Valiollah Mozafarian (1996). Dictionary of Iran plants names .Tehran, Contemporary dictionary.

12- Mirab. Balo.Majid. Hamidreza Borian.Shahram Pishehvar(2008).Entomology and pests defication.Tehran.Marze Danesh Press.

The table of specifications of seed-eating pests and pasture plants samples from Lorestan province in 2012-13					
Row	**Area of collection**	**Height of area**	**Geographical coordinates**	**Genus and specie of host plant**	**Genus and specie of seed-eating pests**
1	**Sheikh Miri**	2130	**48° 41' 01" 33°54 ' 33"**	***Veronica orientalis***	**Gymnetron Niloticum**
2	**Darreh Takht**	2129	**49° 25' 53" 33° 18' 24"**	***Plantago lanceolata***	**Mecinus Labilis**
3	**Sarvand**	2200	**48° 59' 29" 33° 58' 91"**	***Verbascum assurense***	**Rhinusa Neta**
4	**Bisheh**	1870	**48° 37' 80" 33° 27' 25"**	***Phlomis persica***	**Labiaticola syriacus**
5	**Bisheh**	1870	**48° 37' 80" 33° 27' 25"**	***Phlomis persica***	**Labiaticola atricolor**
6	**Bisheh**	1870	**48° 37' 80" 33° 27' 25"**	***Phlomis olivieri***	**Labiaticola araxicola**
7	**Absefid**	2231	**48° 35' 98" 33° 50' 52"**	***Pterocephalus canus***	**Labiaticola atricolor**
8	**Zagheh**	2010	**48° 40' 14" 33° 29' 76"**	***Pterocephalus canus***	**Labiaticola araxicola**
9	**Ghalaei**	1384	**47° 55' 16" 33° 49' 12"**	***Tribulus terrestris***	**Microlarinus rhinocylloides**
10	**Bisheh**	1870	**48° 37' 80" 33° 27' 25"**	***Phlomis persica***	**Bruchidius atricolor**
11	**Sarvand**	2200	**48° 59' 29" 33° 58' 91"**	***Plantago lanceolata***	**Caryedon mesra**
12	**Sarvand**	2200	**48° 59' 29" 33° 58' 91"**	***Prangos acaulis***	**Caryedon mesra**
13	**Shirz**	1360	**47° 42' 28" 33° 47' 10"**	***Eryngium thyrsoideum***	**tube manquant**