

Identification Density And Hosts of Semi Parasite Species in Kahramanmaras Region of Turkey

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Abstract: This study was carried out to determine the hosts and density of mistletoe species which cause problems on the forest and fruit trees in the subregions of Kahramanmaras. According to these surveys, the ratio of existence of *Arceuthobium oxycedri* on the host were determined as high dense and it was 16.990 number/host for *Juniperus oxycedrus* subsp. *oxycedrus*, 15.331 for *Juniperus excelsa* and 14.388 for *Juniperus drupacea*. Also *Loranthus europaeus* was found dense 3.327 on *Quercus cerris* and 2.741 on *Q. infectoria*. Another semi-parasite plant, *Viscum album* subsp. *abietis* was determined as dense 9.922 number/host on *Abies cilicica* subsp *cilicica*, while it was mid dense 0.449 on *Cedrus libanii*. Besides, *V. album* subsp. *austriacum* was found as high dense 14.535 on *Pinus nigra* subsp. *pallasiana*. Whereas, *Viscum album* ssp. *album* was not found on any host in Kahramanmaras.

Keywords: *Arceuthobium*, *Loranthus*, *Viscum*, host, pine trees and density

I. Introduction

Conifer trees and fruit production have an important agro forestry activities in Turkey. Many external factors affect yield and quality of the production of timber and one of the important components of these are parasite and semi-parasite plants. Miller (1982) showed that the term mistletoe was first applied to the European mistletoe (*Viscum album*). *Viscum* species include three subspecies belonging to the species of *Viscum album* in Turkey. This subspecies are *Viscum album* ssp. *album*, *Viscum album* ssp. *abietis* and *Viscum album* ssp. *austriacum*. Ball (1993) showed that three widely distributed subspecies of *V. album* that differ in host specificity have been recognised in Europe: *V. album* subsp. *album* on dicotyledonous trees, *V. album* subsp. *abietis* on *Abies* spp., *V. album* subsp. *austriacum* on *Pinus* spp. and rarely *Larix* spp. Since Mistletoe species have chlorophyll, it can make photo synthesis. However it does not has a root system like the other plants. Haustorium of mistletoe penetrates to xylem of host and so it can be nourished. Mistletoe species have flowers and seeds. The external surfaces of their seeds are sticky, so they can easily stick on tree branches and they are capable of germinate over on hosts (Hawksworth and Scharpf 1986, Hawksworth and Wiens 1996). *A. oxycedri* was reported in Balkan states of Slovenia, Croatia, Bosnia Herzegovina, Yugoslavia and Pakistan on *Juniperus communis*, *J. drupacea* and *J. oxycedrus* (Bondev and Lybenova 1984, Khaldi *et al.* 2000, Sarangzai *et al.* 2010). Species of the genera *Psittacanthus*, *Phoradendron*, and *Arceuthobium* cause the greatest economic and ecological impacts in the Western United States and in Mexico (Geils *et al.* 2002a-2002b). *Viscum* species have spread in many regions of Europe, North Africa, Austria, Asia, China, Western Europe, southern England, Scandinavia, the Balkans, Russia, Japan and Nigeria (Frohne and Pfander 1984, Kirkup *et al.* 2000, Ciesla *et al.* 2004). No research has been carried out in Kahramanmaras region as regards this topic so far.

II. Materials And Methods

The material of this research is mistletoe species, fruit and forest trees. Surveys were applied in Kahramanmaras subregions (Center, Afsin, Adırtın, Caglayancerit, Ekinozu, Elbistan, Gökşun, Nurhak, Pazarcık and Türkoglu) on September and October of 2013-2015. This study was carried out by taking random samples from 10% of total area. Area of forest trees according to Kahramanmaras region; area of Syrian juniper (*Juniperus drupacea* Labill.) 25509 ha, Crimean juniper (*Juniperus excelsa* Bieb.) 21771 ha, Small fruited pine (*Juniperus oxycedrus* L. subsp. *oxycedrus*) 25253 ha, Taurus fir (*Abies cilicica* subsp *cilicica* Carr) 8360 ha, Taurus cedar (*Cedrus libanii*) 19254.4 ha, Crimean pine [*Pinus nigra* Arnold. Subsp. *pallasiana* Holmboe.] 365263 ha, Turkey oak (*Quercus cerris*) 25689 ha, Aleppo oak (*Quercus infectoria*) 15758 ha (Anonymous 2013). Mistletoe branches were counted to using field glass for tall forest trees. As proposed by Güncan (2001), Density of mistletoe species was calculated;

$$\text{Density} = B/n$$

Where B is number of the individuals in the total sample, n is the number of sample. As suggested by Ustuner and Güncan (2002), density scale was used as follows;

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Density scale,

- A. High dense (average more than 10 branch of mistletoe on host)
- B. Dense (average 1-10 between branch of mistletoe on host)
- C. Mid dense (average 0.1-1 branch of mistletoe on host)
- D. Low dense (average of 0.01 to 0.1 branch of mistletoe on host)
- E. Scarce (average of less than 0.01 branch of mistletoe on host)

III. Results And Discussion

Arceuthobium, Loranthus and Viscum species were determined as density and hosts in Kahramanmaras subregions. According to the survey, ratios of *A. oxycedri* were calculated on hosts as follows; high dense (16.990 number/host) on *J. oxycedrus* subsp. *oxycedrus*, (15.331) on *J. excelsa* and (14.388) on *J. drupacea*. But *Loranthus europaeus* was found dense (3.327) on *Quercus cerris* and (2.741) on *Q. infectoria*. In addition, *V. album* subsp. *abietis* was found out to be dense with a ratio of 9.922 number/host on *A. cilicica* subsp. *cilicica* and mid dense 0.449 number/host on *Cedrus libanii*; *V. album* subsp. *austriacum* high dense 14.535 number/host on *Pinus nigra* Subsp. *pallasiana* of Kahramanmaras region. Arceuthobium and Viscum species were not seen on any fruit and landscape trees in Kahramanmaras region.

The density of Arceuthobium, Loranthus and Viscum species were determined respect to Kahramanmaras subregions as follows; Center subregion; *A. oxycedri* was determined dense on *J. o.* subsp. *oxycedrus*, *J. excelsa* and *J. drupacea*. 2.013, 1.902 and 1.021 number/host respectively. Also *V. album* subsp. *abietis* was detected dense with a ratio of 1.034 number/host on *A. cilicica* subsp. *cilicica* while it was not found on *C. libanii*. *V. album* subsp. *austriacum* was found dense 2.784 number/host on *P. n.* subsp. *pallasiana*. Afsin subregion; *A. oxycedri* was detected high dense on *J. o.* subsp. *oxycedrus*, *J. excelsa* and *J. drupacea* in Afsin subregion. 24.392, 21.764 and 20.954 number/host respectively. Also *L. europaeus* was seen dense 1.284 on *Q. cerris* and 1.056 on *Q. infectoria*. Besides *V. album* subsp. *abietis* was determined dense with a ratio of 1.328 number/host on *A. cilicica* subsp. *cilicica*; *V. album* subsp. *austriacum* was seen high dense 12.875 on *P. n.* subsp. *pallasiana*.

Andirın subregion; *A. oxycedri* was found high dense on *J. o.* subsp. *oxycedrus*, *J. excelsa* and *J. drupacea*. 58.935, 51.654 and 50.162 number/host respectively. Besides *L. europaeus* was seen dense 3.158 on *Q. cerris* and 2.654 on *Q. infectoria*. *V. album* subsp. *abietis* was determined high dense with a ratio of 50.238 (number/host) on *A. cilicica* subsp. *cilicica* and dense 1.346 on *C. libanii*. *V. album* subsp. *austriacum* was found high dense 49.983 on *P. n.* subsp. *pallasiana*. Caglayancerit subregion; *A. oxycedri* was determined high dense on *J. o.* subsp. *oxycedrus*, *J. excelsa* and *J. drupacea*. 11.568, 10.645 and 10.076 number/host respectively. Furthermore *L. europaeus* was seen dense (4.132) on *Q. cerris* and (2.573) on *Q. infectoria*. *V. album* subsp. *austriacum* was found high dense 14.684 on *P. n.* subsp. *pallasiana*.

Ekinozu subregion; *A. oxycedri* was determined high dense on *J. o.* subsp. *oxycedrus*, *J. excelsa* and *J. drupacea*. 14.269, 12.873 and 10.550 number/host respectively. Also *L. europaeus* was seen dense (9.382) on *Q. cerris* and (7.465) on *Q. infectoria*. *V. album* subsp. *abietis* was seen mid dense with a ratio of 0.726 number/host on *C. libanii*; *V. album* subsp. *austriacum* was found high dense 15.842 on *P. n.* subsp. *pallasiana*. Elbistan subregion; *A. oxycedri* was found mid dense on *J. o.* subsp. *oxycedrus*, *J. excelsa* and *J. drupacea*. 0.369, 0.355 and 0.256 number/host respectively. Further *L. europaeus* was observed dense with a ratio of 3.750 number/host on *Q. cerris* and 2.934 on *Q. infectoria*.

Göksun subregion; *A. oxycedri* was determined high dense on *J. o.* subsp. *oxycedrus*, *J. excelsa* and *J. drupacea*. 47.219, 43.876 and 40.820 number/host respectively. Also *L. europaeus* was seen dense with a ratio of 5.247 number/host on *Q. cerris*, while it was seen 4.865 on *Q. infectoria*. *V. album* subsp. *abietis* was observed high dense with a ratio of 46.625 number/host on *A. cilicica* subsp. *cilicica*, it was detected dense 2.427 number/host on *C. libanii*; *V. album* subsp. *austriacum* has seen high dense 48.341 on *P. n.* subsp. *pallasiana*. Nurhak subregion; *A. oxycedri* has been determined high dense on *J. o.* subsp. *oxycedrus*, *J. excelsa* and *J. drupacea*. 11.138, 10.241 and 10.043 number/host respectively. Also *L. europaeus* was found dense with a ratio of 6.321 number/host on *Q. cerris* and 5.872 on *Q. infectoria*.

Pazarcık subregion; *V. album* subsp. *abietis*, *A. oxycedri* and *L. europaeus* have not been seen on hosts. But *V. album* subsp. *austriacum* has been found low dense 0.024 number/host on *P. n.* subsp. *pallasiana*. Türkoglu subregion; *V. album* subsp. *abietis*, *A. oxycedri* and *L. europaeus* have not been seen on hosts. In addition to *V. album* subsp. *austriacum* has been calculated mid dense 0.826 number/host on *P. n.* subsp. *pallasiana* in Türkoglu subregion. As a result *A. oxycedri* was observed to be different density on *J. drupacea*, *J. oxycedrus* subsp. *oxycedrus* and *J. excelsa*; *L. europaeus* was found different density on *Q. cerris* and *Q. infectoria*; *V. a. spp. abietis* was detected to be different density on *A. cilicica* subsp. *cilicica* and on *C. libanii*; *V. album* subsp. *austriacum* was observed to be different density on *P. n.* subsp. *pallasiana* in Kahramanmaras subregions. Besides *A. oxycedri* and *V. album* subsp. *austriacum* was found high dense while *V. a. spp. abietis* and *L. europaeus* was found dense on hosts in Kahramanmaras region.

A. oxycedri is widespread in Turkey, *A. oxycedri* usually found on *J. oxycedrus* and *J. drupacea* trees in Turkey (Miller 1982, Hawksworth and Wiens 1996). Density of *Arceuthobium americanum* was determined on *Juniperus* species, density rate; 3%, 9%, 18% and 32% respectively (Hawksworth and Johnson 1989). In Turkey, six taxa have been determined: *V. album*, *V. a. subsp. austriacum*, *V. a. subsp. abietis*, *V. a. subsp. album*, *L. europaeus* and *A. oxycedri* (Dutkuner, 1999). *L. europaeus* host selection and distribution were assessed on Northern Strandjas oak forests in Turkey (Kumbasli *et al.* 2011). *L. europaeus* was observed on oaks, mostly on *Quercus pubescens*, *Q. cerris*, *Q. robur*, *Q. petraea*, *Q. pubescens*, *Q. virgiliana* and *Q. rubra* in slovakia (Hegi 1981, Eliás 1985, 2002). Zebec and Idžojić (2006) showed that *L. europaeus* was found on 7 species: *Quercus robur*, *Q. petraea*, *Q. cerris*, *Q. pubescens*, *Q. frainetto*, *Q. rubra* and *Q. palustris* in Croatia.

V. album ssp. *album* has been determined different hosts such as was observed to be dense as (8.45) on *P. communis*, (7.24) on *Amygdalus* spp., (3.32) on *P. armenica*, (2.56) on *P. elaeagnifolia* and (2.54) on *C. monogyna* in different regions of Turkey (Davis *et al.* 1982, Üstüner 2003, Üstüner *et al.* 2015). *V. album* ssp. *album* was observed on 28 host taxa of trees and shrubs, which represents the highest diversity of host trees in a single locality in the Poland (Kolodziejek *et al.* 2013). But *V. a. ssp. album* has not been found on any hosts in regions of Kahramanmaras while it was reported in the different region of Turkey and world. *V. a. ssp. abietis* has mainly existed in North, Center and South part of Anatolia in Turkey (Davis *et al.* 1982). *V. a. ssp. abietis* was detected to be dense (5.98) on *A. cilicica* in Niğde (Tüfekçi *et al.* 2002, Üstüner 2003).

In conclusion, The mistletoe species which were determined in different densities and hosts in Kahramanmaras region, partially similar reported by Davis *et al.* 1982, Miller 1982, Hawksworth and Wiens 1996, Dutkuner 1999, Tüfekci *et al.* 2002, Üstüner 2003, Kumbasli *et al.* 2011, Üstüner *et al.* 2015 in Turkey. At the same time Hegi (1981), Bondev and Lybenova (1984), Eliás (1985, 2002), Hawksworth and Scharpf (1986), Hawksworth and Johnson (1989); Ball (1993), Khaldi *et al.* (2000), Geils *et al.* (2002a, 2002b), Ciesla *et al.* (2004), Zebec and Idžojić (2006), Sarangzai *et al.* (2010) and Kolodziejek *et al.* (2013) were reported partial similar results in the world with the present study.

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