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Asclepias syriaca A NEW SEGETAL SPECIES IN ROMANIA

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Abstract

The purpose of this study was to report the presence of Asclepias syriaca in agroecosystems in Romania. The species Asclepias syriaca L. is part of the Apocynaceae or Asclepiadaceae family, since 2018, it has been observed in corn culture, in western part of Romania. The study was conducted in 2019-2021, in eight counties (Alba, Arad, Caraş-Severin, Mureş, Sibiu, Satu-Mare, Sibiu, Timiş) in May-August. The species Asclepias syriaca was present in seven counties (Alba, Arad, Mureş, Sibiu, Satu - Mare, Sibiu, Timiş), both in the plain areas (77 m altitude) and in the hills area (412 m altitude). The study carried out in Romania showed that the species is present in the agroecosystems of: corn, alfalfa, sunflower, wheat, soybean. Up to date, there are no studies in Europe that indicate the presence of Asclepias syriaca in the sunflower agroecosystem. We consider that this species, which is classified by EPPO as an invasive species for Europe, will become a weed problem for Romanian crops, due to its strong competitive capacity, due to the rhizomatic root system and the plant's property to produce allelopathic substances.

Key words*: Asclepias syriaca, reporting, crop, area.*

INTRODUCTION

Beeswax (*Asclepias syriaca* L.) is an invasive species in Romania (Sîrbu et al., 2021, Urziceanu et al., 2021), this being in the last 10 years in continuous expansion. The species is native to North America (Bakacsy, 2019). Taxonomically the species *Asclepias syriaca* is classified in: Dicotyledons, Order: *Gentianales*, Family: *Apocynaceae*. The genus *Asclepias* comprises about 140 species. The species is currently found on the continents: America and Europe (EPPO, 2022). According to the CABI database, it is also present on the Asian continent (https://www.cabi.org/isc/datasheet/72 49# toDistri butionMaps).

In Europe, *Asclepias syriaca* was introduced as an ornamental plant in the 17th century (Bagi 2008; Rothmaler 2008; Follak et al., 2021). With its introduction in Europe, the species became subspontaneous, being found in various habitats and in larger areas.

Currently the species has been reported in 27 European countries: Belgium, the Netherlands (Verloove, 2020), France (EPPO, 2022), Switzerland (EPPO, 2022), Italy (Brundu et al. 2020), Germany (Nehring and Skowronek, 2017), Poland (Tokarska-Guzik et al., 2018; Zając, 2019), Austria (Follak et al., 2018), Czech Republic (Kaplan et al., 2017), Slovakia (Mártonfi et al., 2014), Hungary, (Bartha et al., 2015), Bulgaria (Vladimirov and Georgiev 2019), Ukraine (Dvirna, 2018), Romania (Zimmermann et al. 2015, Sîrbu and Oprea, 2011), Slovenia (EPPO, 2022), Croatia (Boršić et al., 2018), Serbia (Vrbničanin et al., 2008), Bosnia and Herzegovina (Maslo, 2016), Montenegro (EPPO, 2022), Lithuania (Gudžinskas et al., 2018), Latvia (Nāburga and Evarts-Bunders, 2019), Sweden (EPPO, 2022), Russia (Smekalova, 2008), Belarus (EPPO, 2022), Denmark (Miljøstyrelsen, 2018), Moldova (EPPO, 2022), Spain (EP PO, 2022).

The distribution of *Asclepias syriaca* in European countries is favoured by its ability to adapt to different climatic and edaphic conditions, it can infest soils of any texture, but most often occurs on well-drained, light-textured soils (Bhowmik and Bandeen, 1976).

Currently the species is found in the List of Invasive Alien Species of Union Concern in 2017 (European Commissions, 2017).

The main characteristics of the plant are milky sap (latex), papule seeds, rhizome propagation

(Bhowmik, 1994; Dvirna, 2018; Follak et al., 2021) and allelopathic substances (asclepiadin, sitoserol, quercetin and nicotine) (Kazinczi et al., 1998). These characteristics were decisive in approaching the studies related to this species, so that in the scientifical papers we will find studies on the positive and negative economic impact.

Studies by Gaertner (1979) and Small (2015) provide information on the industrial and pharmaceutical potential of *Asclepias syriaca*. The latex present in the stem can be used for the rubber tires industry, the flowers are harvested by bees for honey, the fibers in the stem suitable for making paper, the seed doll, being light and waterproof, can be used for protective clothing, the flowers are a source of sugar, which together with lemon can be used for making wine. The species can also be seen as a source of biofuel (Follak et al., 2021).

In Europe, the species has been cultivated for ornamental purposes as well as for beekeeping, *Asclepias syriaca* flowers being an important source of nectar for bees (Bagi, 2008).

In respect of the negative economic impact produced by *Asclepias syriaca*, 3 directions are approached:

Negative impact on biodiversity and ecosystem functionality. *Asclepias* syriaca due to its morphological characteristics and allelopathic potential has managed to spread widely in semi-natural habitats, and for valuable natural ones (protected areas) represent a threat of invasion (Bakacsy, 2019). In semi-natural meadows, *Asclepias syriaca* has slowed down and mitigates their regeneration processes. At the level of native species, this may lead to a reduction in the size of height, Bakacsy (2019). The presence of the species in ecosystems can lead to a decrease in the diversity of some spider species and soil nematodes (Jurová et al., 2019).

Negative impact on health

Asclepias syriaca contains cardioactive steroids, especially asclepiadin, gomfoside, and afrozide (Simpson et al., 2013). The whole plant is toxic, but fruits and seeds contain the most toxic substances. Poisoning in humans is rare, but has been reported (Simpson et al., 2013).

An intoxication report in cattle has been issued in Hungary following the ingestion of large amounts of *Asclepias syriaca* (Sályi and Petri 1987, cited by Follak, 2021).

Negative impact on agriculture

In its native area, *Asclepias syriaca* is found in many crops, it is commonly found in crops like corn, soybeans, wheat, alfalfa (Follak et al., 2021).

In Europe, *Asclepias syriaca* has emerged locally as a weed in field crops (corn, soybeans, cereals, legumes), orchards and vineyards (abandoned) (Follak, 2018a), Slovakia (Pauková et al. 2013, 2014), Czech Republic (Kaplan et al., 2017) and Serbia (Vrbničanin et al., 2008).

In Europe, there are no studies on crop losses caused by *Asclepias syriaca*. Research into production losses is only being conducted in America. For example, at a density of 12 *Asclepias syriaca* plants per m² in spring wheat, caused a loss of 47% of the crop. In sorghum crop, can reduce the yield by 18-30%, in soybean crop by 12-19%, and in corn by 2-10% (Cramer and Burnside, 1982).

Asclepias syriaca is an intermediate host plant for various crop viral diseases and harmful insects (Bhowmik, 1994; Bagi, 2008; Ştef, 2021; Fericean, 2017).

Worldwide, agricultural systems are under the pressure of climate change (Lazu et al., 2019) affecting directly corp production and indirectly the relationship of weeds, payhogens and pests with plants, bringing new challenges for both breeders and farmers în order to face yeld losses and avoid alteration of natural landscape vegetation (Paraschivu et al., 2021; Durău et al., 2021).

Asclepias syriaca, being a new species for agroecosystems in Romania, we intend to identify the crops in which it settled and to know some morphological characteristics in order to establish control methods.

MATERIALS AND METHODS

Establishing agroecosystems

Studies on the presence of *Asclepias syriaca* in the agroecosystem took place between 2019-2021. To signal the species *Asclepias syriaca*, trips were made to the counties: Alba, Arad, Caras-Severin, Hunedoara, Mehedinți, Mureș, Sibiu, Satu Mare, Timiș (Figure 1). The route used to observe the species *Asclepias syriaca* was between 77 m (Uivar - Timiș) and 412 m (Botorca - Mureș) altitude.

Figure 1. Study area

The climate of the sites where the observations were performed is temperate continental, both in terms of temperature (7.5-11.2°C) and rainfall (459-900 mm). The multiannual average temperatures and the amount of precipitation recorded at the study sites are as follows: 8.6°C and 600 mm Jidvei - Alba; 8.0°C and 542-570 mm Pănade - Cetatea de Baltă - Alba; 9.3°C and 550 mm Lunca Târnavei - Alba (https://judetul-alba.ro); 10.0°C and 565-600 mm Șeitin - Arad (Ștef and al., 2021); 10.6°C and 770.6 mm Iaz - Obreja - Glimboca - Jupa - Caras-Severin (https://www.Meteoromania.ro); 9.8°C and 688 mm Adămuș - Botorca - Cornești - Căpâlna de Jos - Mureș (Ștef și colab., 2021); 7.5°C și 707 mm Agârbiciu - Sibiu; 8.7°C and 627.8 mm Axente Sever - Sibiu (https://www.axentesever .ro); 8.6°C and 900 mm Copșa Mică - Copșa Sat - Sibiu; 8.6°C and 600-700 mm Mediaș - Târnava - Sibiu (Ștef and al., 2021); 10.0°C and 500-700 mm Resighea - Satu Mare; 10.95°C and 580 mm Cărpiniș - Timiș; 9-10°C and 623 mm Pădureni - Jebel - V. V. Delamarina - Timiș (http://primaria-padureni. ro); 10.9°C and 631 mm Ghiroda - Timiș (https://primariaghiroda.ro); 10.9°C and 631 mm Săcălaz - Timiș (https://pcdn.ro); 11.2°C and 459 mm Uivar - Timiș ; - 2°C-10°C and 625-750 mm Hunedoara (http://apmhd.anpm.ro/).

Altitude and angular coordinates were determined using GPS. The reported aspects were photographically illustrated.

Determining morphological characters

The plants that were subjected to morphological analysis were sampled from the corn agroecosystem from the Cărpiniș site, Timiș County. Morphological study consisted of investigating a sample of 30 plants. The following biological characteristics were determined: plant height; number of leaves/plants; petiole length; leaf length; the width of the leaf; number of inflorescences; the number of fruits.

The measurements were performed in August 2021. For the measurements, roulette (Figure 2) and graduated ruler were used.

The leaf area was determined by the formula:

$$SF = L \times l \times \text{correction coefficient}$$

Where:

SF - leaf surface; L - leaf length; l - the maximum width of the leaf; correction coefficient - 0.654

The data obtained were interpreted statistically through statistical indicators: mean, standard deviation, coefficient of variation.

Figure 2. Materials used in the study

RESULTS AND DISCUSSIONS

The results of the observations performed during the years (2019-2021) are shown in Table 1, it includes: counties, sites, altitude and agricultural crops in which the weed *Asclepias syriaca* was reported.

Of the eight counties studied, the species was reported in seven counties, it was not identified in the crop areas of Hunedoara county.

In the sites (AB-CeB, AB-Ji, AB-LuT, AB-Pa, CS-Gl, CS-Ob, CS-Ia, CS-Ju, MS-CaJ, MS-Co, MS-Ad, MS-Bo) from Alba, Caras-Severin, Mureș and Satu Mare counties, the species was found only in the corn agroecosystem (Figure 3).

Asclepias syriaca was identified, in Sibiu County, in corn (in the sites SB-Me, SB-CoM, SB-CoS, SB-Tâ, SB-Ag, SB-AxS), alfalfa (SB-Tâ) (Figure 4) and (wheat) stubble (SB-Tâ) (Figure 5).

In Timiș County, the greatest diversity of agroecosystems was identified (soybean (TM-

Ui), sunflower (TM-Ui) (Figure 6), corn (TM-Că, TM-Pă, TM-Gh, TM-Să,), stubble - wheat (TM – Je), stubble - barley (TM – VVDe)], where the invasive species *Asclepias syriaca* was present.

Table 1. Agroecosystems (crops) and sites where the species *Asclepias syriaca* has been reported

Country*	Sit**	Latitude	Longitude	Alt. (m)	Crops
AB	AB-CeB	46.234276°	24.200416°	316	*Zea mays* (maize)
	AB-Ji	46.229195°	24.080848°	267	*Zea mays* (maize)
	AB-LuT	46.218352°	23.971997°	254	*Zea mays* (maize)
	AB-Pa	46.222274°	23.964980°	247	*Zea mays (maize)*
AR	AR-Şe	6.118481°	20.856870°	96	*Medicago sativa* (Alfalfa)
CS	CS-Gl	45.489764°	22.308550°	231	*Zea mays* (maize)
	CS-Ob	45.484833°	22.286159°	217	*Zea mays* (maize)
	CS-Ia	45.476862°	22.241506°	198	*Zea mays* (maize)
	CS-Ju	45.464012°	22.184886°	181	*Zea mays* (maize)
MS	MS -CaJ	46.243007°	24.128583°	271	*Zea mays* (maize)
	MS- Co	46.277958°	24.203265°	314	*Zea mays* (maize)
	MS-Ad	46.312865°	24.280179°	286	*Zea mays* (maize)
	MS-Bo	46.262223°	24.302623°	412	*Zea mays* (maize)
SM	SM-Re	47.597443°	22.278754°	134	Zea mays (maize)
SB	SB-Me	46.140083°	24.312508°	330	*Zea mays* (maize)
	SB-CoM	46.119319°	24.273427°	308	*Zea mays* (maize)
	SB-CoS	46.121097°	24.258509°	284	*Zea mays* (maize)
	SB-Tâ	46.121578°	24.282171°	299	*Medicago sativa* (Alfalfa)
		46.120037°	24.277772°		*Triticum aestivum*
		46.120037°	24.277772°		*Zea mays* (maize)
	SB-Ag	46.065563°	24.188131°	305	*Zea mays* (maize)
	SB-AxS	46.077733°	24.203062°	300	*Zea mays* (maize)
TM	TM-Că	45.782127°	20.962170°	81	*Zea mays* (maize)
	TM-Pă	45.599624°	21.170175°	82	*Zea mays* (maize)
	TM-Je	45.594959°	21.171979°	82	*Triticum aestivum* (wheat)
	TM-Gh	45.793134°	21.326614°	96	*Zea mays* (maize)
	TM-Să	45.768427°	21.131055°	82	*Zea mays* (maize)
	TM – VVDe	45.635295°	21.876437°	151	*Hordeum vulgare* (barley)
	TM-Ui	45.599630°	21.170330°	77	*Helianthus annuus* (sunflower)
		45.657244°	20.872785°	76	*Glycine max* (soybean)

Abbreviations: *AB – Alba; AR-Arad; CS – Caras-Severin; MS - Mureş; SM – Satu Mare; SB – Sibiu; TM - Timiş; ** CeB - Cetatea de Baltă; Ji – Jidvei; LuT - Lunca Târnavei; Pa – Pănade; ŞE - Şeitin; Gl – Glimboca; Ob – Obreja; Ia – Iaz; Ju – Jupa; CaJ – Căpâlna de Jos; Co - Cornești; Ad - Adămuș; Bo – Botorca; Re – Resighea; Me - Mediaș; CoM - Copșa Mică; CoS - Copșa Sat; Tâ – Târnava; Ag – Agârbiciu; AxS - Axente Sever; Că - Cărpiniș; Pă – Pădureni; Je – Jebel; Gh – Ghiroda; Să – Săcălaz; VVDe - V. V. Delamarina; Ui – Uivar.

Figure 3. *Asclepias syriaca* in the corn agroecosystem

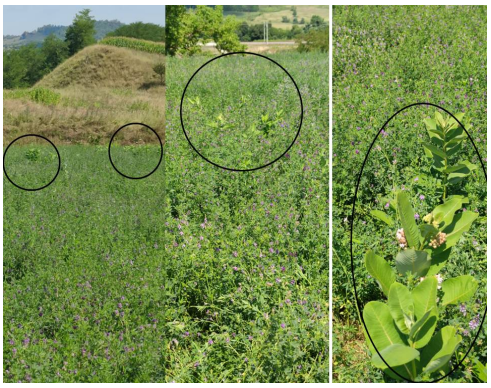

Figure 4. Asclepias syriaca in the alfalfa agroecosystem

Figure 5. Asclepias syriaca in stubble

Figure 6. Asclepias syriaca in the sunflower agroecosystem

Investigations have shown that the species is present in patches in agricultural crops. *Asclepias syriaca*, in most sites, is present in the crop, at the edge, dough there are areas where

appear in the middle of the agroecosystem (Figure 7).

Figure 7. *Asclepias syriaca* installed inside crops (TM-Gh, TM-Ui)

It should be mentioned that the species *Asclepias syriaca* is present in Romania, since 1836 (first report), being introduced as an ornamental species (Urziceanu et al., 2020). In 1939, the species has been found spontaneously in some areas (Ţopa, 1947 quoted by Sirbu and Oprea, 2011, Sîrbu et al., 2021).

Figure 8. Habitats invaded by *Asclepias syriaca* in România: (a) roadside, (b) and (c) agricultural crops (maize and alfalfa), (d) forest edge, (e) lake shore (f) irrigation canal edge, (g) meadows (Photos: Arsene G.G. (d, e, f, g,) and Ştef R (a, b, c)

Asclepias syriaca being adapted to a wide range of climatic and edaphic conditions can persist in many habitats (Bhowmik, 1994). In North America, *Asclepias syriaca* colonizes prairies and alluvial areas, meadows, fields, roadsides, and railroads (Woodson 1954; Cramer and Burnside, 1982 cited by Follak et al., 2021). In Europe, the habitats occupied by *Asclepias syriaca* are abandoned agricultural and viticultural lands, wet and dry meadows, the edge of dams, forests, poplar and pine plantations (Csiszár and Korda, 2017; Gudžinskas et al., 2018; Jarić et al., 2011; Follak et al., 2018; Szatmári et al., 2016). In Romania, the species occupies natural, semi-natural and artificial habitats (Figure 8).

Up to date, the species has been reported to be present in natural and semi-natural habitats in 14 counties (Table 2). Observations performed in the frame of this study (2019-2021) revealed that the species is present in artificial habitats (agricultural crops) in seven counties, six of which are found in the reports in Table 2. In the literature data on the reporting of *Asclepias syriaca*, Alba County lacks natural and semi-natural habitats. Another difference between the two reports refers to the presence of *Asclepias syriaca* in Hunedoara County, although the species is mentioned as being present in natural habitat (Kovács and Pálfalvi, 2012) it seems that it has not yet settled in agroecosystems.

Table 2. Reporting of the species *Aclepias syriaca* in Romania (2000-2022)

Country	Site	Reporting years	Reference
AR	Păuliș	2012	Turcuș and Daraban, 2013
	Vladimirescu	2012	
	Felnac	2012	
	Pecica	2017-2019	Sărățeanu et al. 2020
BC	Ghimeș	2002-2005	Kovács and Pálfalvi, 2012
BH	Sânmartin	2002-2005	Kovács and Pálfalvi, 2012
BV	Piatra Craiului Natural Park	2005-2010	Pop et al., 2011
DJ	Rastu Vechi	2012	Răduțoiu and Stan, 2013
	Calafat	2000 -2004	Ilie et all., 2018
HD	Geoagiu	2002-2005	Kovács and Pálfalvi, 2012
HR	Tudeni	2002-2005	Kovács and Pálfalvi, 2012
	Rugănești	2002-2005	Kovács and Pálfalvi, 2012
	Dejuțiu	2002-2005	Kovács and Pálfalvi, 2012
	Porumbenii Mari	2002-2005	Kovács and Pálfalvi, 2012
	Ulcani	2002-2005	Kovács and Pálfalvi, 2012
	Atid	2002-2005	Kovács and Pálfalvi, 2012
	Firtănuș	2002-2005	Kovács and Pálfalvi, 2012
	Medișoru Mic	2002-2005	Kovács and Pálfalvi, 2012
MH	Cireșu	2010	Negrean and Ciortan, 2014
MS	Sighișoara	2012	Öllerer (cited by Sîrbu et al, 2021)
		2000-2005	Zimmermann et al., 2015
		2000-2004	Sămărghițan et al., 2018
	Roteni	2004	Negrean et al. 2017
	Gălățeni	2004	Negrean et al. 2017
SB	Târnava Mare	2017	Sămărghițan et al., 2018
	Copșa Mică	2010	Bolea et all., 2010
	Dumbrăveni	2002-2005	Kovács J.A., Pálfalvi P., 2012
	Mediaș	2002-2005	Kovács and Pálfalvi, 2012
SJ	Căpâlna	2015	Negrean et al. 2017
	Cristolț	2016	Negrean et al. 2017
	Văleni	2016	Negrean et al. 2017
	Marin NE	2016	Negrean et al. 2017
	Crișeni	2002-2005	Kovács J.A., Pálfalvi P., 2012
	Sărmășag	2016	Negrean et al. 2017
	Cehei	2013	Karácsonyi and Negrean, 2013
SM	Carei Plain protected area	2010-2011	Szatmari, 2012
TL	Danube Delta – Sulina	2011	Anastasiu (cited by Sîrbu,2021)
TM	Satchinez	2005-2011	Otves et al., 2014
	Sânandrei	2017-2018	Cucu et al., 2019
	Surduc	2004-2017	Neacșu et al.,2017
	Pișchia	2005-2006	Neacșu et al.,2007
	Cenad	2013	Turcuș et al., 2014
	Igriș	2012	Turcuș and Draban, 2013

Although in Europe, the species is present in 27 countries, so far there are few studies that indicate *Asclepias syriaca* at weed level. Data published so far show that the species has settled in field crops, vineyards and orchards in Austria, Slovakia, Czech Republic, Serbia, Bulgaria, Poland (Follak, 2018a; Pauková et al., 2013, 2014; Kaplan et al., 2017; Vrbničanin et al., 2008; Dolmagić, 2010).

Results on morphology characters

The analysis of *Asclepias syriaca* plants, harvested from the TM-Că site, showed that the leaves are opposite, elliptical, 16.6-26.5 cm long and 6.9-13 cm wide (Figure 9), population are homogeneous (cv - 10.42%), in terms of length and heterogenity in terms of width (cv - 41.44%) and leaf area (cv - 53.66%). These morphological features differ from the studies of Ujvárosi (1973), Bagi (2008), Gudžinskas et al. (2019). The determined length, in the present study proved to be higher than the values obtained by those mentioned above (7-20 cm; 10-20 cm), and the width proved to be less (5-15 cm, 5-11 cm).

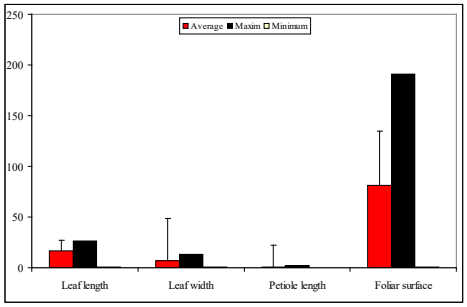

Figure 9. Biometrics of foliar characteristics within the population of *Asclepias syriaca*

The basal leaves of the plant are lighter green, and those on the upper canopy are darker green. The leaves have densely hairy on the underside (Figure 10).

Figure 10. *Asclepias syriaca* leaves

The leaves are inserted on the stem through a short petiole of 0.1 mm - 1.8 mm, with cv – 21,13%. The length of the petiole differs from those mentioned by Gudžinskas et al. (2019). The number of leaves per plant varied between 18-42, the variability low (21.75%).

The stem of *Asclepias syriaca* is erect, robust, hairy, green to purple, generally unbranched, according to the literature, but in the present study we also found specimens that showed branches, from 20-40 cm above the ground. *Asclepias syriaca*, from the corn agroecosystem, grew up to 150 cm. In terms of size, the population of *Asclepias syriaca* is homogeneous, the variation coefficient being 18.95% (Figure 11).

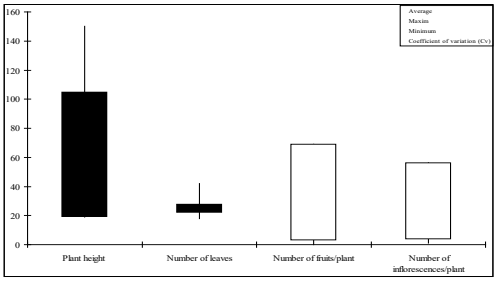

Figure 11. Results on the biometrics of the morphological characters within the population of *Asclepias syriaca*

The population of *Asclepias syriaca*, from Lithuania, analyzed by Gudžinskas et al. (2019), exerted a lower average waist (95.7 cm) compared to Romania. Results like those in Romania, in terms of the size of beeswax plants, were recorded in Hungary (Bagi, 2008).

The fruit produced by *Asclepias syriaca* is a capsule (Figure 12), the plants from the analyzed population presented 0-8 capsules/ plant, the dimensions reached were 6-11.5 cm, the number of seeds was 131-280.

They have a long white papus (Figure 13), which appears in large follicles (Bagi, 2008; Petrova et al., 2013; Tokarska-Guzik et al., 2015) which propagates species along with rhizomatic roots. The number of inflorescences and fruits showed a high coefficient of variation of 56.4% and 68.99%, respectively, which indicates that the population has a high heterogeneity (Figure 11).

On a beeswax plant, between 1 and 8 umbels were found (Figure 11), but not all of them end

up bearing fruit. The flowers are fragrant, nectariferous grouped in umbellate tops, pink - reddish (Figure 14).

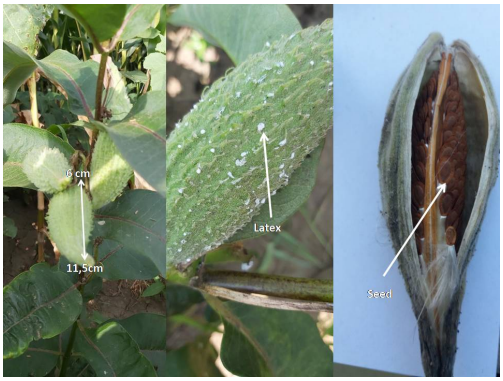

Figure 12. Fruit of *Asclepias syriaca*

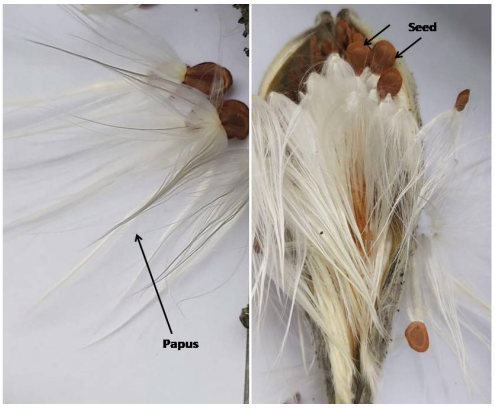

Figure 13. Seed and papus of *Asclepias syriaca*

The *Asclepias syriaca* plants, harvested from the TM-Că site, produced an average of 3.67 inflorescences/plant (Figure 11).

Figure 14. Inflorescences (umbellate tops) and individual flowers of *Asclepias syriaca*

In its native habitat in Washington state (USA), *Asclepias* sprouts produced 2-7 inflorescences (average 5) (Finer and Morgan 2003). In Lithuania the population studied by Gudžinskas et al. (2019) presented an average number of inflorescences of 3.4/plant (with minimums and maximums between 2-5). The average number of inflorescences in the population of *Asclepias syriaca* in Europe is lower than in the USA, the country of origin. These differences could be influenced by the climatic and ecological conditions of the habitats, as well as by the different angular coordinates (Romania - 45.78.21'N, Lithuania 54°28.51'N, Washington USA - 47°25.43'N).

CONCLUSIONS

The species *Asclepias syriaca* is expanding on the Romanian territory, settling in more and more agroecosystems. The observations made highlighted the presence of the species *Asclepias syriaca* in 7 counties out of the 8 studied. The species is present both in the plain area (77 m altitude) and in the hilly area (412 m altitude). We believe that studies should continue because this species will become a weed problem for Romanian crops, due to its strong competitive capacity, rhizomatic root system and the property of the plant to produce allelopathic substances.

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