

Survey of appearance and development of different wild species from genus of *Hyoscyamus*, *Datura* and *Solanum* (Solanaceae) in Hamedan (West of Iran), as an example for presence of ruderal plants in cities.

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ABSTRACT: Having scrutinized, both floristic and ecological, dispersal as well as presence of *Solanum*, *Hyoscyamus* and *Datura* (wild species from Solanaceae family) in 400 various biotopes of Hamedan urban area for the first time ever between 2015 and 2016, it was generally proved that this urban ecosystem along with its nature can be considered as apposite ecological habitats for a wide variety of mentioned species. Furthermore, nature of urban area of Hamedan, regarded as an anthropogenic zone, was found as a sole shelter of taxon, a member of Solanaceae, that it was nearly impossible to observe one kind of *Solanum*, *Hyoscyamus* and *Datura* species out of this location's urban areas.

Keywords: Solanaceae, Anthropogenic, Hemerochor, Hamedan

INTRODUCTION

In Persian language, Solanaceae family is identified by names such as Eggplant family (Darvish 1967, Golgolab 1977) or Potato family (Shahsavari 2014, Mozaffarian 1996) or Eggplant order (Ghahremani-nejad 2013). Solanaceae family possesses more than 2700 species spreading in widespread floristic areas of the Earth. There belongs a majority of species of this family to genus of *Solanum* with further than 1000 species. According to investigations into sprawl of this species, America continent, particularly in southern America, is regarded as extensive habitats for various species. Nowadays, there is seen to be a presence of species of Solanaceae family, frequently in a vast majority of part of the world except polar and desert, either in terms of planted or wild; however, some of which like *Solanum physalis*, as well as lyceum can grow all over the world. Aside from cosmopolitan genera there are found 13 genera in altitudes of Andes as well as 3 other genera in southeast of southern America. Other groups are exclusively appeared in a floristic zone (Nothoestrum from Hawaii, Normania from Canary Islands or Combera and Benthamia which are exclusively observed in Patagonia). Asia is known as sole place of *Tubocapsicum* genera such as *Bouchetia*, *Grabowskia*, *Leptoglossis*, *Leucophysalis*, and *Petunia* have local deployment. Deployment of various taxa of this family is abundant in Asia, too. Added to this *Atropa*, *Mandragora*, *Lycianthes*, *Hyoscyamus* and *Withania* are other genera in different parts of the world. Africa is known as a feeble floristic area for this family, because of possessing only 8 genera out of identified ones. *Discopodium* genus is merely reported in Africa. Genera of *Triguera* and *Mandragora* aside from two other cosmopolitan genera naming *Solanum* as well as *Lycium* are both in Africa and Europe. There are some prevalent genera in Asia, Europe, and Africa continents like *Hyoscyamus* or *Withania*. *Tubocapsicum* genus is just found in Asia. Additionally, *Atropa* and *Mandragora* are common between Asia and Europe, while Asia, Europe, and Africa are joint between *Lyciamthes*,

Hyoscyamus and *Withania*, in turn, Asia achieve second rank after Africa. It is Australia in which Anthocercideae (Nicotinoideae) caste with 7 species is observed and also 18 exclusive species have been since reported in this country (Olmstadt and colleagues, 2008).

Increasing the species of this family, with 10 genera and totally 38 wild species, in different zones of Iran (Khatamsaz 1998) as well as a number of planted elements with either economic aspects such as *Solanum melongaea*, *Solanum lycopersicum*, *Capsicum annum*, *Nicotiana tabacum* or ornamental value like *Petunia hybrida*, *Solanum pseudo-capsicum* possess high floristic and environmental level.

Regarding presented classification by Olmstadt and colleagues in 2008 which is implied to 14 castes and some sub castes for all taxa altogether (1-Benthamielleae, 2-Cestreeae, 3-Browallieae, 4-Salpiglossideae, 5-Petunieae 6-Schwenckieae, 7-Anthocercideae, 8-Hyoscyameae, 9-Lycieae, 10-Capsiceae, 11-Capsiceae, 12-Juanulloaeae, 13-Physaleae, 14-Solaneae), observed species in under the studying confinement are only belong to 2 subfamilies of Solanoideae and castes of Hyoscyameae (*Hyoscyamus* genus) Caspiceae (*Capsicum* genus), Datureae (*Datura* genus), Physaleae (*Physalis* genus) and subfamily of Solaneae (*Solanum* genus).

It must be stated that *Lycopersicom esculentum* species is sometimes classified under the names of *Solanum esculentum*; however, based on Olmstaed and colleagues (2008) it is introduced as *Solanum lycopersicum* which is a subfamily of Solanoideae. Due to the fact that second name is more precise based on Taxonical rules, *Solanum lycopersicum* is utilized in this essay instead of *Solanum esculentum*.

Materials and methods

Not until April 2014 could we begin investigations into recognition as well as presence of observed species' sprawl from *Hyoscyamus*, *Datura* and *Solanum* genera which are members of Solanaceae family, continuing up to spring of 2015. In order to identification as well as surveying the environmental position of observed species, including both indigenous wild and planted species. Totally 400 parts of Hamedan city's nature was studied. Schoenbeck-Temesy (1972) – in series books of Flora-Iranica - as well as Khatamsaz (1998) – in Flora of Iran series books- were utilized so as to recognition of three observed genera, additionally, Flora – Orientalis (fifth cover) by Pierre Edmond Boissier (1897) and other diverse books were references. Observed species were altogether collected from 10 crop regions, 20 central park (specially, Mellat and Eram parks as two mega urban ones) beside a number of urban boulevards and streets as well as their surroundings, green spaces, forsaken crop fields, Mosalla hill and other suburban and urban area of this city. Followed by providing a dispersal map to introduce presence and sprawl of observed genera of *Hyoscyamus*, *Solanum* and *Datura*.

Target of this essay

Undoubtedly and in most cases when discussing on presence and dispersal of plant species, either aboriginal species (meaning without human involvement) or non-indigenous ones (Hemerochor species which willingly or not have been entered a region by human in past times), there is no distinction between their appearance's position whether they reside in a pristine or nearly pristine environment or even in unstable urban ecosystems. Finally, there are seen to be some problems related to denote the exact biotopes of taxon. Confines and biotopes constructed in an urban ecosystem have tremendous differences in relation with suburban areas, thereby, recognition of urban environments and introduction of its wild species as existent elements, is main and final aim to specify many a biological species and the type of appearance of development of which in urban biotopes and also identifying city as an unstable but vital ecosystem for different plants groups.

Identifying of cities and urban nature has confronted with new aspects so that it is not only investigated in more than one dimension, but it also is considered as a place in which animal and plant species (whether planted or wild) possess a vital and unique level beside human as main members. A city contain a number of indigenous or non-indigenous wild species which must be protected. What comes into attention mostly is to get the citizens familiarized with animal and plant species as well as other lifestyles in different urban areas. Therefore, the city must not be noted as just a residential region for human. Eventual and significant goal of urban ecology knowledge and introducing intercity biological species is to get familiar to cases such as biotopes recognition, conserving ecosystems, protecting biological species, increasing species diversity, segregation of native species from non-indigenous ones, maintaining wild species and also expanding their environment in any urban biotopes. Basically a city is dead without its history as well as its historical identity. What comes to view is part of an individual's spirit. There is no place for a city's culture and traditions, if its past is not considered. Consequently, it is not feasible to destroy the national identity via constructing buildings as well as abolishing history. Because what is not tangible any more, fail to be introduced as a national and environmental heritage. Generally, conservation and maintenance

beside innovation are 3 factors in order to stable survival which lead to an important and worthwhile occasion as well as history of a city.

Results

Based on research done, for the first time up until research time, in association with presence and development of species of 3 observed species from Solanaceae family in Hamedan intercity environments, it is seen that this family species in a majority of urban biotopes, particularly in crop fields or abundant crop fields and destroyed regions or off the structural brans as ruderal species, are considerably available. The taxa of this family are observed in various shapes in urban environments. Some of which grow wildly without human engagement in ruderal and segetal intercity environments. Species of *Hyoscyamus* genus or a group which some of its elements are mostly in terms of planted; although *stramonium*, *Datura* and *Datura innoxia* or once planted species from *Solanum* genus such as *Solanum tuberosum* and *Solanum lycopersicum* and also *Solanum nigrum* as well as *Solanum dulcanara* which are completely wild, are such examples.

Achieved results from done research on 3 mentioned genera show that presence of observed species of these 3 genera only are restricted to anthropogenic environments as well as altered urban fields. None of taxa of these 3 genera were observed out of out of destroyed environments, thereby, what has been introduced as observed elements of these three species` provenience by Schoenbeck-Temesy (1972) and Khatamsaz (1998), undoubtedly are consist of destroyed fields. Development of 6 observed species of *Hyoscyamus* (*H. kurdicus*, *H. niger*, *H. reticulatus*, *H. arachnoideus*, *H. arachnoideus*, *H. squarrosus*), for instance, in the under studying restriction, merely include devastated ecosystems in external and internal confines of Hamedan city. In another word, none of them were observed out of anthropogenic environments. Indicating another point, the number of presented proveniences by Khatamsaz (1998) are much considerable, whereas the environment of all *Hyoscyamus* species in the under studying confine includes Ruderal-segetal regions and many a 6 species mentioned above are introduced as urbanophil elements. Presence of *H. squarrosus*, *H. niger*, *H. reticulatus*, and *H. pusillus* species, which are reported from Hamedan city initially, imply the stuff that Hamedan, as a deprived region of research, needs more precise and deeper probes in relation with identification of habitats of different Solanaceae family`s species, specially anthropogenic environments and urban natures in comparison with countryside areas and nearly natural. In these cases, it is of vital necessity that cities, as appropriate locations for many plant species, be ecologically and environmentally attended well. Presented maps related to dispersal of observed species of *Hyoscyamus* as well as *Datura* genera shows abundant presence of their species in Hamedan urban area. Environments which totally needs deep ecological and taxonomical research as well as possess high environmental worth.

Discussion

The texture and structure of every city is thought to be a dynamic symbol in order to gaining knowledge about its past as well as present. This texture includes a serious of phenomena such as art, philosophy, architecture, and so on which in a region`s cultural frame states its history, in turn, urban texture includes the shape and view of a city in different approaches. It does not mean present shape of city when talking about urban texture, but more precise, it means to recognize a city`s former structure and probably has been destroyed or altered. Because the main aim of presenting such essay is to do protect our heritage, not the things that have been creating. Beyond doubt, surveying a city and its problems include all matters which are related to the city, but a point which needs further attention is to consider numerous unplanned constructions which are apparently visible in majority of cities. What has confronted with more environmental destructions is both traditional texture of cities and its nature, generally what has remained from our ancestor as national inheritance. Nature which has been formed based on social as well as local needs over time is one of the remains from city`s past. Nature of a city indicates its social history. The nature that possess both planted and wild elements. Combination of these two elements forms historical and cultural atmosphere of a city. Not only is not the goal of securing a city`s nature to have a green space, but it also is to respect the history of that city as well as identifying type of life in the past and also their thoughts which are the significant aims. Each of available planted species in a city has itself a history as though open up new approach for scientific research. The sole method in order to comprehend the citizen`s lifestyle and their needs as well as their consumptions in the past is to taking assistant from accomplished datum deriving from urban nature.

So none of plant species beside animal elements which are available, any kind, in urban areas are without mystical and scientific worth in this regard and in order to introduce presence and dispersal of plant species in Hamedan urban restriction, observe elements from Solanaceae family (Figure 1), as one out of 72 observed and

collected species in this city, were probed. Presence of many wild observed species of this family proves that their biotopes mostly include surrounding of crop fields (abandon ones in particular), gardens and streets` surroundings, therefor, for sake of protection of this plant family`s wild species in urban areas, more attention must be paid to such zones. Removing weeds from garden, around of streets`, paths of water stream, around of trees and other urban green spaces accomplished by municipality everyday undoubtedly, to a tremendous extent decrease the possibility of wild species growth.



Figure 1 – shown on the figure above are *Datura innoxia*, *Datura stramonium*, *Hyoscyamus niger*, and *Solanum dulcumara* from left to right ,respectively, which observed in urban areas of Hamedan (Anthropogenic areas). This species and some of other species of Solanaceae, as the Ruderal species, are observed abundant in many of urban areas.

Introduction of wild observed species` presence and development from Solanaceae family is an instance so as to none of the biological species are absurd or with a less worth as well as there is no status in science for such way of thinking.

Up to the time that something is unknown, it is impossible to protect it. In this term, any biological element is the first stage to identify a creature and ultimate step in regarding to recognizing of urban biotopes as well as keeping all of which.

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