

HOVER FLIES (DIPTERA: SYRPHIDAE) FROM RICE FIELDS AND AROUND GRASSLANDS OF NORTHERN IRAN

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ABSTRACT: The syrphids' fauna of Iran is very diverse and was studied rather well in recent years. In the present paper, 24 species (of 19 genera and 2 subfamilies) were collected from the rice fields and around grasslands of Northern Iran. Of these, *Chrysotoxum festivum* (Linnaeus), *Helophilus hybridus* Loew and *Melangyna umbellatorum* (Fabricius) are newly recorded from Iran.

KEY WORDS: Fauna, Syrphidae, Rice field, Distribution, new record, Iran.

Flower flies (Diptera: Syrphidae) are a large and diverse group of insects. Many species are important pollinators of flowering plants. In addition, the immatures of numerous species are predators of destructive aphids and other pests (Gilbert, 1981). These flies are expert fliers and can hover or fly backward, an ability possessed by few insects other than syrphid flies. The adults mainly feed on nectar and pollen. The females must consume pollen since they need the proteins and amino acids of the pollen for maturation of their eggs. Nectar has only a small amount of these substances but much sugar. It is the fuel for the flies, enabling them to fly and hover actively. Being regular visitors of flowers, hoverflies are important pollinators of various plants including vegetables and fruit trees (e.g. Asteraceae, Brassicaceae, Rosaceae). The flies select the flowers mainly by their colours (Kan, 1988).

Compared with the adults, the larvae are important predators, feeding primarily on aphids that attack citrus, subtropical fruit trees, grains, corn, alfalfa, cotton, grapes, lettuce and other vegetables, ornamentals, and many wild host plants of the aphids. Three large ecological groups can be distinguished: predators, miners and decomposers (living on dead organic material - saprophagous larvae). All species of the subfamily of Syrphinae have zoophagous larvae. Their main preys are aphids (greenflies). The larvae of Microdentinae are associated with hymenopterans. The Microdentinae larvae are supposed to be zoophagous living in ant nests. *Eumerus* and *Merodon* larvae are plant-eating (phytophagous) miners. They live in/at dead bulbs (in fact at least

some may feed on fungi in the decaying tissues). The larvae of the remaining eristaline species are saprophagous organisms; they live in various habitats (running or stagnant water, mud, compost heaps, rotten wood etc.) feeding on dead organic substances (Chandler, 1968a,b).

Hoverflies can be found in every biotope but not in deserts. Each species tends to prefer a certain type of habitat and is limited to a distinct range within the country. In general, within a genus the needs and behavior of the species are similar. As a result, one tends to associate certain genera with particular habitats. For example *Chrysogaster*, *Eristalinus*, and *Mesembrius* (all with aquatic or semi-aquatic larvae) are typical found in wetlands, many tiny Paragus species live in grassland whereas species of *Baccha*, *Melanostoma* and *Xylota* prefer woodlands. Within a given habitat the hoverflies have an irregular distribution. Some prefer the low vegetation (like *Melanostoma* and *Paragus*), others can be observed in the tree canopies (like *Mallota* and *Spheginobaccha*). There are also differences in the horizontal distribution of the adults at a site since important structural components like certain flowers or egg laying sites cannot be found everywhere within a habitat (Heiss, 1938; Schneider, 1969; Stubbs & Falk, 2002).

The hoverflies can be efficient predators in cereal crops such as wheat, rice and corn (Lapchin et al., 1987). Although the fauna of Syrphidae in Iran was studied rather well (Modarres Awal, 1997; Dousti, 1999; Khiaban et al., 1998; Alichy et al., 2002; Gharali et al., 2000, 2002; Goldasteh et al., 2002; Moetamedi nia et al., 2002, 2004; Sadeghi et al., 2002; Pourrabi et al., 2003; Amirmoghadam et al., 2004; Golmohammadi and Khiaban, 2004), but the fauna of Mazandaran province was studied only by Gilasian and Vujic (2004), and the fauna of cereals (wheat) was studied only by Kamangar et al. (2004). On the other hand, the syrphids' fauna of Iranian rice fields was not studied so far and the present work is the first paper on this subject. Mazandaran province that is located south of Caspian Sea (Fig. 1) is agricultural centre of Iran with different geographical climates and diverse flora and the more diverse fauna is expected in this region. Concerning the Iranian Syrphidae, totally, 124 species were recently reviewed by Dousti and Hayat (2006).

METHODS

Adult syrphids were sampled by a variety of methods, including visually scanning crops while walking, aerial netting, suction traps, and Malaise traps. The materials were collected from rice seedlings and weeds around and within the rice fields. Usually there are several grass plants especially Asteraceae, Malvaceae, Rosaceae, Brassicaceae and etc. Around the rice fields that were sampled in this research. The collected materials were determined by different credit identification keys especially, Speight (1994), Speight et al. (1998), and Stubbs and Falk (2002). In addition to the adults, several syrphid larvae were collected from the weeds that were

identified by the identification key Heiss (1938). After determining the specimens, the materials were sent to the authorized specialists for confirmation.

RESULTS

Totally, 24 species of 19 genera and 2 subfamilies were collected from the rice fields of Northern Iran and around grasslands. In addition to the rice fields, many grass plants including, Amaranthaceae, Asteraceae, Brassicaceae, Compositae, Euphorbiaceae, Gramineae, Rosaceae, Labiatea, Leguminosae, Malvaceae, Rhamnaceae, Tilliaceae, Urticaceae, and Verbenaceae were sampled and the flying materials were collected. The list of identified Syrphidae is follow:

Subfamily SYRPHINAE

1. *Chrysotoxum festivum* (L., 1758)

Behshahr (Rice field), 1♀; July 2005.

Distribution: Fennoscandia south to Iberia and the Mediterranean, including N Africa; from Ireland eastwards through much of Europe into Turkey and European parts of Russia; through Siberia to the Pacific coast; Japan; northern India (Speight, 2006); Turkey (Hayat and Alaoglu, 1990a; Saribiyik and Aktaş, 1996; Saribiyik, 1999, 2000).

New record for the Iranian Fauna.

2. *Episyrphus balteatus* (De Geer, 1776)

Savadkooh (*Sorghum halepense*; Gramineae), 1♀, 1♂; April 2000. Babol (Rice field), 1♂; August 2003. Sari (*Rubus idaeus*, Rosaceae), 1♀; July 2000. Amol (Rice field), 1♂; May 2005. Ghaemshahr (*Prosopis farcta*, Leguminosae), 1♀; November 2002. Joibar (*Rosa damascena*, Rosaceae), 1♂; August 2003. Savadkooh (*Mentha pulegium*, Labiatea), 3♂; June 2002. Behshahr (*Ricinus communis*, Euphorbiaceae), 1♂; April 2002. Ramsar (*Sonchus oleraceus*, Compositae), 2♂; October 2001. Nooshahr (Rice field), 2♀; April 2005. Babol (*Hibiscus esculentus*, Malvaceae), 1♀; July 2004. Neka (*Brassica napus* var. *oleifera*, Brassicaceae), 1♀, 2♂; May 2006. Ghaemshahr (Rice field), 1♀, 1♂; June 2004. Amol (*Amaranthus retroflexus*; Amaranthaceae), 1♀; September 2004.

Distribution: Fennoscandia to the Mediterranean; Canary Isles, Azores and N Africa; Ireland through Eurasia to the Pacific coast; south through the Oriental region to Sri Lanka; Australia. This is an extremely migratory species (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Hayat and Alaoglu, 1990a; Saribiyik and Aktaş, 1996; Saribiyik, 1999, 2000, 2003a).

3. *Eupeodes corollae* (F., 1794)

Amol (Rice field), 1♀, 1♂; May 2003. Babol (*Amaranthus blitoides*, Amaranthaceae), 1♀, 1♂; July 2004. Neka (*Brassica sinapis*, Brassicaceae), 1♀; April 2002. Sari (*Chenopodium opulifolium*, Chenopodiaceae), 2♀, 1♂; May 2005. Savadkooh (*Ricinus communis*, Euphorbiaceae), 1♀, 1♂; August 2001. Joibar (Rice field), 2♀; June 2004. Babolsar (Rice field), 1♀; June 2002.

Distribution: From Iceland, Fennoscandia and the Faroes south to Iberia, the Mediterranean, Madeira, the Canary Isles and N Africa; coastal States of Africa down to and including S Africa; Mauritius; from Ireland eastwards through most of Europe into European parts of Russia; through Siberia from the Urals to the Pacific coast; Japan; China; Formosa. This is a highly migratory species (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Hayat and Alaoglu, 1990a; Saribiyik and Aktaş, 1996; Saribiyik, 1999, 2000, 2003a).

4. *Ischiodon scutellaris* (Fabricius, 1805)

Ghaemshahr (*Sorghum halepense*; Gramineae), 1♀; August 2003.

Distribution: Transcaucasus; Soviet Middle Asia, Far East, Turkey, Iran, Afghanistan, Mongolia, Japan, Oriental Region, New Guine (Peck, 1988).

5. *Melangyna (Melangyna) umbellatorum* (Fabricius, 1794)

Amol (Rice field), 1♂; July 2005.

Distribution: Fennoscandia south to Iberia; from Ireland eastwards through northern, central and southern Europe (Italy, the former Yugoslavia, Romania, Bulgaria) into European parts of Russia; through mountainous parts of Siberia to Kamchatka; in N America from Alaska to Arizona (Speight, 2006).

New record for the Iranian Fauna.

6. *Melanostoma mellinum* (L., 1758)

Amol (Rice field), 1♀; June 2005.

Distribution: From Iceland and Fennoscandia south to Iberia, the Mediterranean and N Africa; from Ireland eastwards through most of Europe into European parts of Russia; Siberia from the Urals to the Pacific coast; N America from Alaska to Quebec and south to Washington (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Hayat and Alaoglu, 1990a; Sarbiyik and Aktaş, 1996; Sarbiyik, 1999, 2000, 2003a).

7. *Meliscaeva auricollis* (Meigen, 1822)

Sari (*Malva montana*, Malvaceae), 1♀; June 2000.

Distribution: Fennoscandia and the Faroes south to Iberia, the Mediterranean (including Cyprus, Malta and Crete), Canary Isles, N Africa, Turkey and Israel; Ireland eastwards through most of Europe into European parts of Russia (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Sarbiyik and Aktaş, 1996; Sarbiyik, 1999, 2000, 2003a).

8. *Paragus bicolor* (Fabricius, 1794)

Neka (Rice field), 1♀; August 2004.

Distribution: From Belgium (extinct) south to the Mediterranean and N Africa; from France eastwards through central and southern Europe to Mongolia; Iran and Afghanistan; N America (Speight, 2006); Turkey (Hayat and Alaoglu, 1990a; Sarbiyik and Aktaş, 1996; Sarbiyik, 1999, 2000, 2003a).

9. *Platycheirus albimanus* (F., 1781)

Nooshahr (Rice field), 1♀; August 2005.

Distribution: Greenland, Iceland, the Faroes and Fennoscandia south to Iberia and the Mediterranean; from Ireland eastwards through most of Europe into Turkey and European parts of Russia; in Siberia from the Urals to the Pacific coast (Kuril Isles); Philippines; in N America from Alaska south into Canada and western parts of the USA (Speight, 2006); Iran (Dousti and Hayat, 2006).

10. *Scaeva albomaculata* (Macquart, 1842)

Ghaemshahr (*Cichorium intybus*, Asteraceae), 1♂; June 2004

Distribution: Iberian peninsula and round the Mediterranean basin to Morocco; Canary Islands; eastward through southern Russia, the Caucasus and southern Siberia to the far east and northern China; Afghanistan, Mongolia; highly migratory and occasionally reaches as far north as Britain (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Hayat and Alaoglu, 1990a; Sarbiyik and Aktaş, 1996; Sarbiyik, 2000, 2003a).

11. *Scaeva dignota* (Rondani, 1857)

Sari (*Rapistrum rugrosum*, Brassicaceae), 1♀; July 2003. Babol (*Crataegus microphylla*, Rosaceae), 1♀; April 2001. Ghaemshahr (*Eruca sativa*, Brassicaceae), 1♂; May 2002.

Savadkooh (*Malva montana*, Malvaceae), 2♀; August 2004. Ramsar (Rice field), 1♀; June 2006. Behshahr (Rice field), 1♀; April 2002.

Distribution: Denmark, Belgium, France (from Brittany southwards) and the Czech Republic south to the Mediterranean (including Crete); from Portugal and Spain eastwards through central (Germany, Switzerland, Austria) and southern Europe to the former Yugoslavia; Greece and Turkey; N Africa (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Hayat and Alaoğlu, 1990a).

12. *Scaeva pyrastris* (L., 1758)

Ghaemshahr (Rice field), 1♀; May 2005. Joibar (*Avena fatua*, Gramineae), 1♀; August 2005. Babol (*Sorghum halepense*; Gramineae), 1♂; July 2001. Tonekabon (*Xanthium spinosum*, Compositae), 1♂; June 2002.

Distribution: Fennoscandia south to Iberia, the Mediterranean, Canary Isles and N Africa; from Ireland east through much of Europe and Asia Minor into European Russia; through Siberia from the Urals to the Pacific coast (Kuril Isles); India; China; N America from Alaska to California and New Mexico. This is an extremely migratory species (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Hayat and Alaoğlu, 1990a; Sarıbiyik and Aktaş, 1996; Sarıbiyik, 1999, 2000, 2003a).

13. *Sphaerophoria scripta* (L., 1758)

Behshahr (*Brachiaria eruciformis*, Gramineae), 1♂; April 2004. Chalus (*Sinapis arvensis*, Brassicaceae), 2♀; July 2004. Amol (*Rubus hyrcanus*, Rosaceae), 1♂; August 2003. Savadkooh (*Hibiscus syriacus*, Malvaceae), 1♀; April 2002. Noor (*Sorghum halepense*; Gramineae), 1♂; November 2004. Sari (Rice field), 1♀; August 2006.

Distribution: A highly migratory species; southwest Greenland, Iceland and Fennoscandia south to the Mediterranean, the Canary Isles and N Africa; from Ireland eastwards through much of the Palaearctic to the Pacific coast of Asia; Kashmir and Nepal (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Hayat and Alaoğlu, 1990a; Sarıbiyik and Aktaş, 1996; Sarıbiyik, 1999, 2000, 2003a).

14. *Syrphus ribesii* (L., 1758)

Behshahr (Rice field), 1♀, 1♂; June 2005.

Distribution: From Iceland and Fennoscandia south to Iberia and the Mediterranean; Canary Isles; from Ireland eastwards through most of Europe into Turkey, European parts of Russia and Afghanistan; from the Urals to the Pacific coast (Kuril Isles); Japan; N America from Alaska south to central parts of the USA. This species is highly migratory (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Hayat and Alaoğlu, 1990a; Sarıbiyik and Aktaş, 1996; Sarıbiyik, 1999, 2000, 2003a).

Subfamily MILESIINAE

15. *Eristalinus (Lathyrrophthalmus) megacephalus* (Rossi, 1794)

Sari (*Xanthium pensylvanicum*, Compositae), 1♀; April 2004. Amol (*Avena fatua*, Gramineae), 1♂; May 2005. Ghaemshahr (*Sorghum halepense*; Gramineae), 1♀; June 2002. Ramsar (Rice field), 1♀; August 2006.

Distribution: Southern Spain and coastal parts of Italy round the Mediterranean basin (including islands, e.g. Corsica, Malta, Sicily, Crete) to Turkey and on into Egypt and N Africa; southwards through the Afrotropical region to S Africa (Speight, 2006); Iran (Dousti and Hayat, 2006).

16. *Eristalinus (Eristalodes) taeniops* (Wiedemann, 1818)

Amol (*Crataegus pentagyna*, Rosaceae), 1♂; July 2004.

Distribution: Portugal, Spain and round the Mediterranean basin (southern France including Corsica, Italy including Sardinia and Sicily, parts of the former Yugoslavia, Albania, Roumania, Cyprus, Greece (including Crete and Rhodes), Turkey, Lebanon, Israel,

N Africa (Syria, Egypt, Libya, Tunisia, Morocco), Canary Islands, Transcaucasus; in eastern parts of the Afrotropical region down to South Africa (inclusive) and in Nepal and parts of Pakistan and northern India in the Oriental region (Spheight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Hayat and Alaoglu, 1990b).

17. *Eristalis (Eoseristalis) arbustorum* (L., 1758)

Amol (*Raphanus raphanistrum*, Brassicaceae), 1♀; June 2004. Behshahr (*Xanthium spinosum*, Compositae), 1♂; July 2003. Nooshahr (*Sorghum halepense*; Gramineae), 1♀; September 2000. Noor (*Xanthium pensylvanicum*, Compositae), 1♀, 1♂; April 2005. Chalus (Rice field), 1♀; June 2002. Neka (*Ziziphus spina-christi*, Rhamnaceae), 1♀, 1♂; October 2002.

Distribution: Throughout the Palaearctic region, including N Africa; N America from Wisconsin to Labrador and south to Kansas and South Carolina; reaches the Oriental region in northern India (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Hayat and Alaoglu, 1990b; Aktaş and Sarıbiyik, 1996; Sarıbiyik, 1999, 2001, 2003b).

18. *Eristalis (Eoseristalis) similis* Fallén, 1817

Behshahr (*Rapistrum rugrosum*, Brassicaceae), 1♂; September 2004. Amol (Rice field), 1♂; April 2005.

Distribution: Finland south to the Mediterranean basin (including islands such as Crete); N Africa; from Britain (central England) eastwards through central and southern Europe to the former Yugoslavia and on through Turkey and European Russia into Asia (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Sarıbiyik, 1999, 2001, 2003b).

19. *Eristalis (Eristalis) tenax* (L., 1758)

Sari (*Vitex pseudo-negundo*, Verbenaceae), 1♂; November 2004. Joibar (*Hibiscus syriacus*, Malvaceae), 1♂; July 2003. Noor (*Avena fatua*, Gramineae), 1♀; August 2004. Ramsar (*Xanthium pensylvanicum*, Compositae), 1♂; April 2005. Amol (Rice field), 1♀; June 2005.

Distribution: Highly migratory; cosmopolitan; the most widely distributed syrphid species in the world, known from all regions except the Antarctic; found throughout Europe except in the far north. It occasionally reaches offshore islands of northern Europe, such as the Faroes (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Hayat and Alaoglu, 1990b; Aktaş and Sarıbiyik, 1996; Sarıbiyik, 1999, 2001, 2003b).

20. *Helophilus hybridus* Loew, 1846

Amol (Rice field), 1♀; April 2006.

Distribution: From Fennoscandia south to northern France; from Ireland eastwards through much of northern and central Europe (though very localised in the Alps) into Russia and on through Siberia to the Pacific coast; Mongolia; in N America from Alaska to Nova Scotia and south to Utah (Speight, 2006); Turkey (Aktaş and Sarıbiyik, 1996; Sarıbiyik, 1999).

New record for the Iranian Fauna.

21. *Myathropa florea* (L., 1758)

Amol (Rice field), 1♀; April 2006. Ghaemshahr (*Xanthium pensylvanicum*, Compositae), 1♂; August 2005.

Distribution: From Fennoscandia south to Iberia and the Mediterranean, the Canary Isles and N.Africa; from Ireland eastwards through Eurasia to the Pacific coast (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Sarıbiyik, 1999, 2001, 2003b).

22. *Syrirta pipiens* (L., 1758)

Ghaemshahr (Rice field), 1♂; June 2006. Babol (*Corchorus olitorius*, Tilliaceae), 1♀; September 2003. Noor (*Lactuca orientalis*, Asteraceae), 1♀; June 2004. Amol (*Urtica dioica*, Urticaceae), 1♀, 3♂; July 2005. Sari (Rice field), 1♂; April 2005.

Distribution: Becoming cosmopolitan; known from most of the Palaearctic, including north Africa, most of N America, S America and the Oriental region. But records from the

Afrotropical region are apparently erroneous (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Hayat and Alaoğlu, 1990b).

23. *Volucella zonaria* (Poda, 1761)

Amol (Rice field), 1♀; May 2005.

Distribution: From Poland south to the Mediterranean (including islands, e.g. Crete) and N Africa; from Britain (southern England) eastwards through central and southern Europe (Italy, the former Yugoslavia, Greece) into Turkey and European parts of Russia and on through Siberia to the Pacific; Iran; Mongolia. This species is strongly migratory (Speight, 2006); Iran (Dousti and Hayat, 2006); Turkey (Hayat and Alaoğlu, 1990b; Aktaş and Sarıbyık, 1996; Sarıbyık, 1999, 2001, 2003b).

24. *Xylota segnis* (L., 1758)

Behshahr (*Sorghum halepense*; Gramineae), 1♀; June 2005.

Distribution: Throughout Europe except for the extreme north; north Africa; the Caucasus; through Eurasia to the Pacific coast and Japan; eastern parts of N America (Speight, 2006); Turkey (Sarıbyık, 1999, 2001, 2003b).

The results indicates that there are diverse fauna of Syrphidae in rice fields of Northern Iran and around grasslands, as 24 species with three new records, *Chrysotoxum festivum* (Linnaeus), *Helophilus hybridus* Loew and *M. umbellatorum*, were collected. Also, among the 21 species, *Episyrphus balteatus* is the most dominant species in all regions of Northern Iran. Iran is a large country incorporating a various geographical regions and climates and therefore consequently it would be expected that a large number of hoverflies remain to be discovered in other regions.

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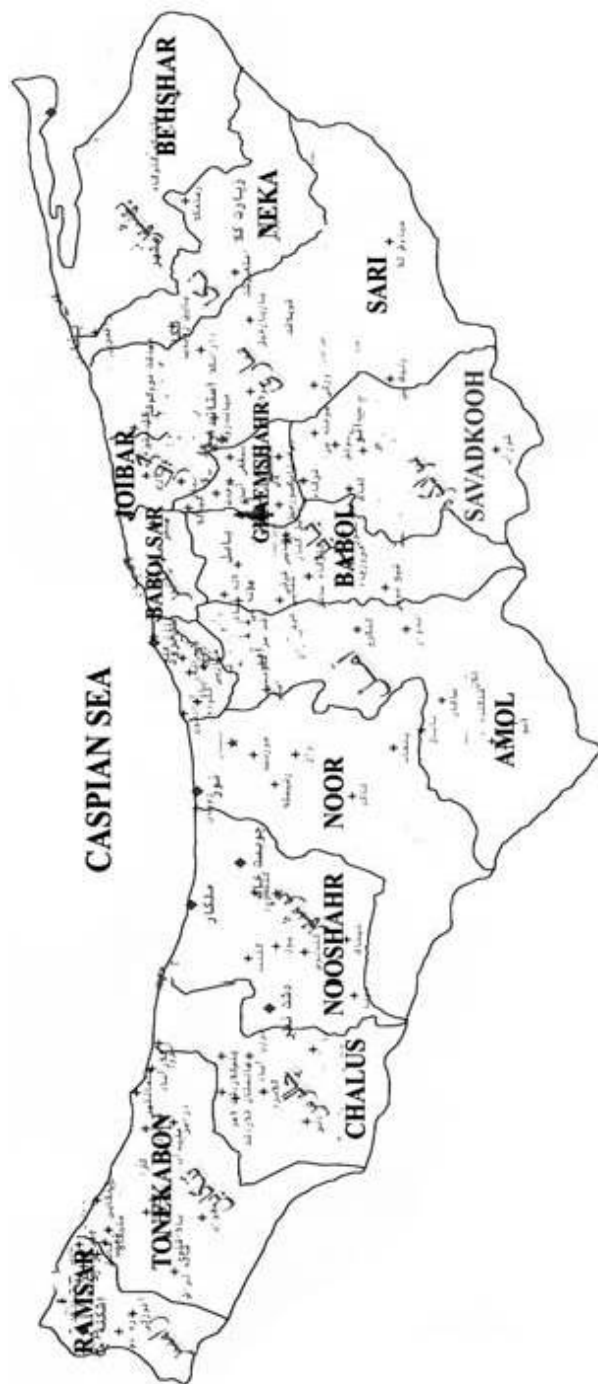


Figure 1. The map of Mazandaran province (Northern Iran) included all the regions and cities.