Major sugarcane pests and their management in Iran

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Abstract Sugarcane is an important cash crop in Iran and has a strategically impact on both social and governmental issues. Under Iranian conditions, the crop is vulnerable to attack by different types of insect and mite pests which impose economic damage on sugarcane. These pests can be divided into stalk borers, leaf feeders, root feeders and sucking pests. Stalk borers Sesamia spp. are the major insect problems in Iranian sugarcane. Larvae of stem borers feed directly on the vegetative tissues that store sucrose and, therefore, directly reduce yield. Sucking pests include spider mites and white flies. Spider mites have been recorded attacking sugarcane (including hybrids) and its relatives such as wild canes. Most of these mites belong to the genus Oligonychus and the economically important species in Iran is O. sacchari. White flies belonging to genus Neomaskellia feed on the sap of leaves and reduce the quality of cane juice. Root feeders are defined as cane grubs and can damage the root system and destroy whole plant. Leaf feeders are relatively new emerging pests in sugarcane, attacking mainly ratoon crops – they belong to the genus Mythimna. This paper summarizes briefly the nature of the major insect problems encountered in Iranian sugarcane cultivation, describes how they are dealt with, and discusses the present state of knowledge of the problems which have been important in the last 20 years in Iran.

Key words Stalk borers, leaf feeders, root feeders, sucking pests.

INTRODUCTION

Sugarcane (hybrids of Saccharum) is a strategically important crop that has a profound economic impact on social and governmental issues in many countries around the world (James 2004). The most important region for production of sugarcane in Iran is the province of Khuzestan where the crop is cultivated on more than 100,000 ha each year (Sadeghzadeh-Hemayati et al. 2011). As a monoculture system, sugarcane is vulnerable to many abiotic and biotic stresses including insect herbivores and pathogens. In this paper, we discuss the major insect species that affect sugarcane in Iran.

STALK BORERS

Stalk-boring lepidopteran insect pests are among the major production constraints in the commercial sugarcane fields in Iran (Askarianzadeh et al. 2008). Two species of stalk borer are important in the Province of Khuzestan, the major sugarcane producer in Iran (Sadeghzadeh Hemayati et al. 2011), Sesamia cretica Lederer and Sesamia nonagrioides (Lepidoptera: Noctuidae). Both are capable of causing economic losses to commercial varieties and affect the sugar industry by both direct and indirect crop damage (Askarianzadeh et al. 2008; Nikpay and Volpe 2016). The genus Sesamia is one of many tropical and subtropical stalk borers, many of which are pests of graminaceous crops including wheat, corn, rice, sugarcane, sorghum as well as many annual and perennial weeds. Adult moths are nocturnal and females oviposit behind the green leaf sheaths of sugarcane; the young larvae feed on the leaf sheaths for 2-3 days before boring into the stalk. In young cane, larval damage can produce ‘dead-heart’ symptoms. Serious injury to host plants can occur when larvae bore into the stalks. In mature sugarcane the tops of infested plants tend to weaken, die or lodge (Fig. 1).
Infestations can reduce the amount and purity of sugarcane juice and entrance holes provide entrance for the red-rot pathogen (Long and Hensley 1972). Management of stalk-boring Lepidoptera in sugarcane is multi-tactic and several control options are used around the world. These tactics include biological control, cultural practices, varietal resistance, silicon amendments and insecticide sprays (Beuzelin et al. 2011; Nikpay et al. 2014; Nikpay and Goebel 2015; Nikpay et al. 2015). In Iran, biological control is currently the dominant tactic with the releasing of parasitic wasps. The egg parasitoid *Telenomus busseolae* Gahan (Hymenoptera: Scelionidae) is the key biological agent and annually a large number of wasps are used in augmentation program.

**WHITEFLIES**

The sugarcane whitefly, *Neomaskellia andropogonis* Corbett (Hemiptera: Aleyrodidae), is one of new emerging pests and damage from this pest seems to be expanding in recent years. This pest was confined in sugarcane fields in north of Khuzestan province, but in the last decade, all sugarcane fields in the south of Khuzestan province have been infested by this whitefly (Askarianzadeh and Manzari 2006; Minaei-Moghadam et al. 2010; Nikpay 2016) (Fig. 2).
In addition to sugarcane, *N. andropogonis* can infest grass weeds, including cogon grass (*Imperata cylindrica*) and Bermuda grass (*Cynadon dactylon*) which are the main perennial weeds of sugarcane (Nikpay, unpublished data). This whitefly has also been reported from India, Pakistan and Sri Lanka. Activity of this pest begins in late August by which sugarcane is storing sucrose in stalks, so an attack by *N. andropogonis* reduces sugar content especially in early-maturing varieties (Askarianzadeh 2011). Several control options are available, including cultural, biological control with parasitoids and predators, and chemical treatments. In sugarcane fields in Khuzestan province, two species of wasp parasitoids *Encarsia inaron* (Walker) (Hymenoptera: Aphelinidae) and *Eretmocerus delhiensis* Mani (Hymenoptera: Aphelinidae) are active and have significant impact on whitefly populations, especially in November (Nikpay 2016).

**MITES**

Sugarcane yellow mite, *Oligonychus sacchari* (McGregor) (Prostigmata: Tetranychidae), is an occasional pest of sugarcane in Iranian sugarcane fields. Infestations generally occur during late May-early August, and the lower leaves of sugarcane are usually colonized first. However, prolonged heavy infestations are accompanied by extensive damage to the middle and upper leaves of young plants, reducing plant growth (Fig. 3).

![Damage by yellow mite to susceptible variety CP57-614.](image)

Whilst sporadic in nature, infestations invariably impact on plant growth and yield. Usually in the summer months, large outbreaks of spider mites can occur in sugarcane fields in southwest Khuzestan province (Nikpay et al. 2013). In severe infestations of this species photosynthetic activity was adversely affected and crops appeared red/yellow due to fine webs (Hall et al. 2005). All active stages of spider mites damage sugarcane by removing juices from infested leaves, causing premature drying that result in loss of leaf tissue and reducing the plant's ability to produce and store sugar. Possible options for controlling this pest rely on chemical and botanical acaricides and silicon (Nikpay et al. 2013; Nikpay and Soleyman-Nejadian 2014), cultural practices (Hall 1988; Nikpay et al. 2013) and biological control with coccinellid beetles (Biddinger et al. 2009). Chemical acaricides have been relied upon; however, these are not always effective and their continuous use has resulted in resistance among *O. sacchari* populations due to its rapid life cycle and multiple generations.

**LEAF FEEDERS**

Larvae of some noctuids (Lepidoptera) that feed voraciously and attack in groups in search of food are commonly referred to as armyworms. The most destructive species in Iranian sugarcane are in the genus *Mythimna*. Larvae of *Mythimna* feed generally on monocotyledons, e.g. pasture grasses, sugarcane, and maize. In sugarcane fields this pest usually has four generations per year and mainly attack ratoon crops and seed-cane fields where trash is retained (Nikpay 2016) (Fig. 4).
Fig. 4. Damage by Mythimna on leaves (a) and larvae (b).

Burning trash in seed-cane fields, cultural practices, pest monitoring, biological control conservation and application of selected insecticides can be used for management of leaf feeders.

ROOT FEEDERS

Whitegrubs or canegrubs are occasional pests of sugarcane in Iran, feeding voraciously on roots. The main species of canegrub in Iranian sugarcane fields is Pentadon idiota (Herbst). This species is polyphagous, feeding on other crops including corn, sugar beet, cotton, and tomato as well as grass weeds. P. idiota is merovoltine and one generation takes 15-20 months. Larvae of this pest feed on sugarcane roots and the pith of stalks (Fig. 5).

Cultivation and fallowing, especially in summer, application of diazinon insecticide through herbigation, and use of light traps which provide a cost effective way of monitoring adult populations and capture large numbers of beetles have been used as control options.

REFERENCES

Ravageurs de la canne à sucre majeurs et leur gestion en Iran


Mots-clés: Canne à sucre, fourres de tige, défoliateurs, ravageurs des racines, piqueurs-suceurs

Las principales plagas de caña de azúcar y su gestión en Irán

Resumen. La caña de azúcar es un cultivo comercial importante en Irán, con un impacto estratégico y ecológico en los sistemas socio-gubernamentales. Bajo condiciones iraníes, el cultivo de caña de azúcar es vulnerable al ataque de diversas categorías de insectos y ácaros que causan daño económico a la caña de azúcar. Estas categorías se dividen en barreneros del tallo, defoliadores, rizófitos y chupadores. Los barreneros del tallo (Sesamia spp.) son el principal problema entomológico en la agroindustria iraní de la caña de azúcar. Las larvas de los barreneros se alimentan directamente de los tejidos vegetativos que almacenan sacarosa y por lo tanto...
reducen directamente el rendimiento. Los insectos chupadores incluyen ácaros y moscas blancas. Las “arañas rojas” se han registrado atacando la caña de azúcar (incluyendo híbridos) y cañas silvestres. La mayoría de estos ácaros pertenecen al género Oligonychus y la especie de mayor importancia económica en Irán es O.sacchari. Las moscas blancas pertenecen al género Neomaskellia y pueden chupar la savia de las hojas y reducir la calidad del jugo de la caña. Los insectos rizófagos conocidos como gusanos blancos de la caña pueden dañar el sistema radicular y destruir toda la planta. Los defoliadores son una plaga emergente en la caña de azúcar principalmente en los retoños y pertenecen al género Mythimna. Es nuestro propósito en este artículo de revisión, resumir brevemente la naturaleza de los principales problemas con insectos plaga encontrados en el sistema de cultivo de la caña de azúcar, para describir la forma en que son tratados y discutir sobre el estado actual del conocimiento de los problemas entomológicos que han sido importantes en los últimos veinte años en Irán.

**Palabras clave:** Caña de azúcar, barrenadores del tallo, defoliadores, rizófagos, chupadores