

Table 1 (Continued)

Scientific name	Common name	Family	Plant part used and preparation	Pharmacological Studies*	Phytochemical informat**
<i>Valeriana edulis</i> Nutt. ex Torr. & A. Gray	Valeriana	Valerianaceae	Root infusion		
<i>Valeriana procera</i> Kunth	Valeriana	Valerianaceae	Root infusion	Alloxanic mice (–)	
<i>Verbesina crocata</i> (Cav.) Less.	Capitaneja	Asteraceae	Leaves infusion	Alloxanic mice (+)	
<i>Verbesina persicifolia</i> DC.	Huichin	Asteraceae	Plant (aerial) infusion	Alloxanic mice (+)	Sesquiterpens
<i>Zaluzania angusta</i> (Lag.) Sch. Bip.	Limpia tuna	Asteraceae	Root infusion		
<i>Zantoxylum fagara</i> L.	Tankasché	Rutaceae	Leaves infusion		Alkaloids
<i>Zea mays</i> h.	Pelos de elote	Poaceae	Fruit infusion		
<i>Zexmenia gnaphalioides</i> A. Gray	Peonia	Asteraceae	Root infusion		
<i>Zizyphus acuminata</i> Benth	Corongoro, amol	Rhamnaceae	Plant (aerial) infusion		

\* In the Animal studies +, indicates activity and the level of it, while—mean no observed activity for the tested extract.

\*\* The phytochemical information, refers about the reports for the plant no the active compounds.

isolated from *Psacalium* spp., processes for obtaining the novel eremophilanolide sesquiterpenes and methods for their use as hypoglycemic agents, for example, in the treatment of diabetes.” Sadly, Mexicans have had no say in developing this patent on a Mexican plant.

Instead we review the current information of some lesser known plants commonly used in México to treat type 2 diabetes and summarise and discuss ethnobotanical, pharmacognostical, phytochemical, pharmacological and clinical data for the main species reported as hypoglycaemic in México (Table 1).

### 3. Ethnopharmacology of commonly used antidiabetic plants in México

Seven species used throughout México, reported in the international literature with pharmacological and phytochemical studies are discussed in greater detail and their potential for developing phytomedicines with a validated profile of activity and demonstrated safety profile is analysed (Table 2).

#### 3.1. *Cecropia obtusifolia* Bertol. (Cecropiaceae)

The hypoglycaemic effect of this plant sold on several markets as a treatment for type 2 diabetes is well known in México, DF (Andrade-Cetto, 1999) and it is also known from many ethnobotanical collections in rural lowland areas (e.g. Heinrich, 1989).

##### 3.1.1. Botanical description

A monopodic tree 20 m tall, growing in secondary vegetation in the tropical rain forest. This tree has a tall, straight, hollow trunk and a stratified treetop with few large branches growing horizontally from the trunk. The leaves are in a spiral disposition located at the top of the branches and are simple, peltate or deeply palmate, with a deep green colour in the

upper face and grey at the lower surface. It is a fast-growing pioneer tree from tropical America, the hollow septate twigs are inhabited by ants (Pennington and Sarukhán, 1998).

##### 3.1.2. Distribution

It is widespread in México, along both coasts, from Tamaulipas and San Luis Potosí to Tabasco on the Gulf of México, and from Sinaloa to Chiapas on the Pacific side. It is, in fact, a weedy species, which would presumably be relatively easy to grow on a larger scale or to harvest it sustainably by collecting material in the first few years after a *milpa* (corn field) has been given up.

##### 3.1.3. Ethnobotany

Traditionally the dry leaves (15 g) are boiled in water (500 ml), the resulting infusion is cooled in the pot, then filtrated and drunk as “agua de uso”. The cold infusion is consumed over the day or when the people have thirst. The use is reported from the following Mexican states, Hidalgo, Guerrero, Veracruz, Yucatan, Campeche, Tabasco, Edo. de México, Oaxaca and Chiapas. The traditional names include “Guarumbo”, “Chancarro”, “Hormiguillo”, “Chiflon” and “Koochlé” among others.

##### 3.1.4. Main constituents

The following constituents have been reported:  $\beta$ -sitosterol, stigmasterol, 4-ethyl-5-(*n*-3valeroil)-6-hexahydrocoumarin and 1-(2-methyl-1-nonen-8-il)-aziridine (Argueta, 1994). The type of extract for the isolated compounds has not been specified. From the butanolic extract Andrade-Cetto and Wiedenfeld (2001) isolated chlorogenic acid and isoorientin (Fig. 1 compounds 1 and 2). The isolated compounds are also found in the medicinal tea.

##### 3.1.5. Pharmacology

A hypoglycaemic effect of the water extract was demonstrated in alloxan diabetic mice (Pérez et al., 1984), in hyperglycaemic rabbits (Román-Ramos et al., 1991) and in