



## Pollinarium morphology of *Vincetoxicum* (Apocynaceae: Asclepiadoideae) in Turkey

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### Abstract

In this study, the pollen morphology of 20 representatives of ten taxa of *Vincetoxicum* from Turkey was observed under a scanning electron microscope and light microscope. Observations showed that each flower contained five pollinaria, including a pair of pollinia and caudicles attached to a central corpusculum. In the investigated taxa, the shape of the pollinium varied from ovate, elliptical, and obovate, to clavate, pollen cell surfaces exhibited gemmate or rugulate ornamentation, and the shape of the corpuscula was ovate or oblong. Numerical analysis showed that the shape of pollinia and corpuscula, size and surface ornamentation of pollen cells, and size of corpuscula and caudicles are valuable traits in delimiting the examined taxa. A key to Turkish *Vincetoxicum* based on pollinarium morphology is presented.

**Key words:** Anatolia, micromorphology, pollen morphology, pollinium

### Introduction

*Vincetoxicum* Wolf (1776: 130) (Apocynaceae: Asclepiadoideae) comprises approximately 100 species, distributed from Europe and the Mediterranean, to eastern Asia (Yamashiro *et al.* 2008, Endress *et al.* 2014). *Vincetoxicum* consists of perennial herbs growing in dry, open rocky slopes, steppes, river valleys, shrubs, mountain slopes, and *Quercus* Linnaeus (1753: 994) dominated forests (Browicz 1978). Members of the genus are known to be poisonous to humans and some have been used in conventional and folk medicine (Mansoor *et al.* 2011).

Browicz (1978) reported six species and four subspecies, excluding doubtful records, in the first account of Turkish *Vincetoxicum*. More recently, Güner (2012) listed ten taxa of *Vincetoxicum* from Turkey, including three endemics (*V. canescens* (Willdenow) Decaisne [1844: 523] subsp. *pedunculata* Browicz [1975: 265], *V. fuscatum* Reichenbach [1854: 17] subsp. *boissieri* (Kusnezov) Browicz [1978: 171], and *V. parviflorum* Decaisne [1844: 525]). A number of authors have investigated morphological (Liede 1996, Yamashiro *et al.* 2008), karyological (Albers & Meve 2001, Yamashiro *et al.* 2002), chemical (Stærk *et al.* 2005, Zaidi 2006, Mansoor *et al.* 2011), and molecular (Liede 2001, Liede & Kunze 2002, Yamashiro *et al.* 2004, Goyder *et al.* 2007, Liede-Schumann *et al.* 2012) properties of *Vincetoxicum* in general, while studies of Turkish *Vincetoxicum* specifically have focused on pharmaceutical (Özay 2013), and anatomical and seed micro-morphological properties (Ilçim *et al.* 2010).

*Vincetoxicum* is a systematically difficult genus, including many closely related species with complex and variable floral features (Browicz 1978). In order to solve systematic problems in a number of genera of Apocynaceae, pollinarium morphology has been investigated by several authors using light microscopy (Sinha & Mondal 2011, Gaykar *et al.* 2012, Sreenath *et al.* 2012) and scanning and transmission electron microscopy (Verhoeven & Venter 2001, Verhoeven *et al.* 2003, Wanntorp 2007, Mo *et al.* 2010). However, there are a very limited number of studies on the pollinarium morphology of members of *Vincetoxicum* (Shah & Ahmad 2014, Yaseen & Perveen 2014). Consequently, in order to contribute to an increased understanding of the genus, the aim of the present study is to describe the pollinarium morphology of ten taxa of Turkish *Vincetoxicum* using light microscopy and scanning electron microscopy.