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An Internal Structure Investigation on *Euphorbia* L. Species in North-East of Iran

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Abstract: In present research anatomical studies carried out 11 species which growing in Khorassan Province (North-East of Iran). These species were divided to two groups, annual and perennial species. For comparative anatomy studying, cross sections from stem and leaf were prepared using microtome and differential staining. The characters of secondary xylem and axial parenchyma, arrangement of vessel and the arrangement of mesophyll were studied. The results showed the variation of internal structure didn't have correspondence to taxonomy position.

Key words: Anatomy, Euphorbiaceae, laticifer, *Euphorbia*, axial parenchyma, Iran

INTRODUCTION

Euphorbia L. belongs to Euphorbiaceae have annual and perennial species with cyathium inflorescence and laticifer. As the recent report, this genus have 67 species in Iran. The extract of this plant have anti-cancer, activation of tumors, inhibition of HLV-1 multiplication, eye burns, anti bacterial, viral and fungal effect (Hussein *et al.*, 1999; Frustenberger and Hecker, 1985; Frohn *et al.*, 1993; Natarujan *et al.*, 2005; Nawito *et al.*, 1999; Giordani *et al.*, 2001; Glattaar-Saalmuller and Fallier-Becker, 2001).

The earlier anatomy studying on Euphorbiaceae had been reported about formation of laticifer (Fahn, 1990). So, comparative internal structure study on *Euphorbia* carried out for first time. In present study, stem and leaf anatomy of 11 species in longitudinal and cross sections were investigated. Also wood analysis carried out.

MATERIALS AND METHODS

As for the anatomic study, the examined species were collected from the localities in North-east of Iran during May-June 2002-2003 (Table 1). For preparing of longitudinal and cross section of stem and leaf, base of stem and basal leaves were selected from 6- 7 specimens. The living materials were fixed in FAA then they were dehydrated with ethanol and later, some slices were

Table 1: The localities of studied *Euphorbia* species

| Species | Localities |
|------------------------|--|
| <i>E. granulata</i> | Mashhad, Sade- Kardeh, 1450 m, Basiri |
| <i>E. cheirolepis</i> | Sarakhs, Dolatabad, 300 m, Joharchi, 19193 |
| <i>E. densa</i> | Neyshabour, Fakhre Dawood, 1370 m, Basiri |
| <i>E. petiolata</i> | Mashhad, Ferdowsi University, Basiri |
| <i>E. helioscopia</i> | Mashhad, Sade Torogh, Arefi village, 1260 m, Jafari |
| <i>E. bungei</i> | Bojnourd, Robate Gharebil, 3 km Jajarm, 1400 m, Hojat and Zangoee, 31061 |
| <i>E. aucheri</i> | Bojnourd, Giphan, Micino mountain, 1800 m, Joharchi and Zangoee, 20798 |
| <i>E. microsciadia</i> | Mashhad, Kang village, 1850 m, Basiri |
| <i>E. buhsei</i> | Sarakhs, Mozdouran, Bazangan, Basiri |
| <i>E. marshalliana</i> | Mashhad, Sade Kardeh, Jafari |
| <i>E. szovitzii</i> | Quchan, north of Faruj, 1375 m, Basiri |

prepared with microtome. 12-microns thickness was stained with Safranin and Fast-green (Johnson, 1940; Metcalf and Chalk, 1983; Chamberlain, 1990). For the stem maceration, this organ was placed in Jeffery solution for 4 h to soften. The plants were divided to annual and perennial. Annual species were following: *E. granulata*, *E. densa*, *E. szovitzii*, *E. helioscopia*, *E. cheirolepis* and perennial species were following: *E. microsciadia*, *E. marshalliana*, *E. buhsei*, *E. bungei* and *E. aucheri*.

RESULTS AND DISCUSSION

Anatomic results in stem of annual species showed, the laticifer existed around the cortex (e.g., *E. cheirolepis* and *E. petiolata*). The laticifer observed above the phloem in *E. helioscopia* stem (Fig. 1, 2). Decreasing of

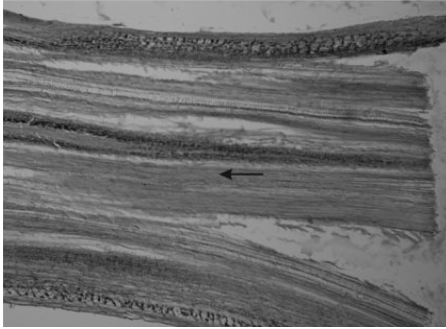


Fig. 1: Longitudinal section of *E. cheirolepis* stem. The arrow showing laticifer in cortex (x416)

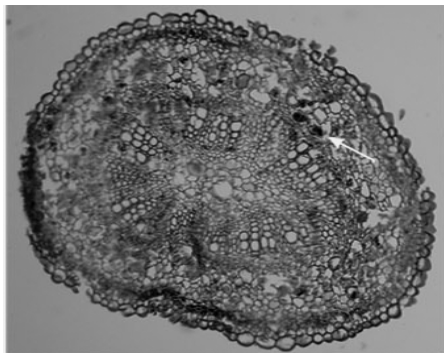


Fig. 2: Cross section of *E. petiolata* stem. The arrow showing laticifer above phloem (x416)

cortex and pith with dense laticifer and cluster-radial chain pore vessel were observed in *E. petiolata* (Fig. 3a). The internal structure of stem showed variation in perennial species. The dense gelatinous fiber, tension wood existed in them. Diffuse porous was observed in *E. marshalliana* (Fig. 3b). All of them had apotracheal boundary axial parenchyma, non-articulated laticifer in phloem. The arrangement of vessel were radial chain pore with solitary in *E. microsciadia* (Fig. 3c), radial chain pore in *E. marshalliana* and *E. buhsei* and cluster in *E. aucheri* (Fig. 3d). The vascular rays was uni-seriate or multi-seriate. The vessels had spiral, reticulate and pitted thickening. The vessel was short and wide with simple perforation plate (Fig. 4a, b).

The results of leaf anatomy showed, isolateral mesophyll in *E. petiolata*, *E. marshalliana* and dorsiventral in *E. helioscopia* (Fig. 5a, b).

The anatomy results showed variation in internal structure but we can not any correspondence between them. The presence of gelatinous fiber due xerophytic plant. Ring porous and diffuse porous were observed in mesophytic and xerophytic species. Some of them adapted to arid weather. Diffuse porous and cluster vessel are more advanced (Metcalf and Chalk, 1983; Fahn, 1990). On the basis of vessel arrangement, *E. microsciadia* is primitive by having diffuse porous and solitary vessel. *E. buhsei* and *E. marshalliana* more advanced by having

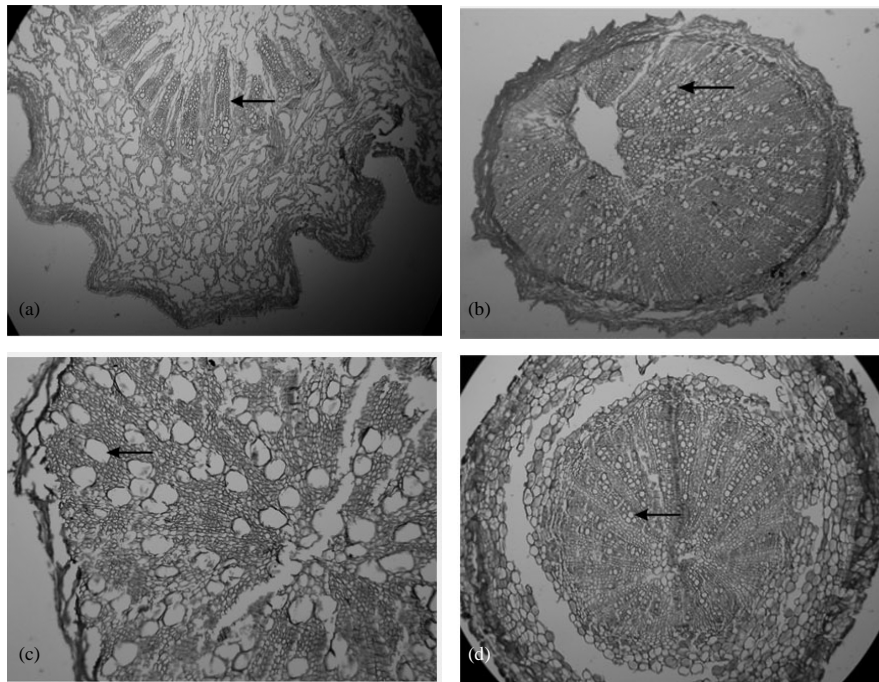


Fig. 3: The arrangement of vessel in: (a) *E. petiolata*, (b) *E. marshalliana*, (c) *E. microsciadia* and (d) *E. buhsei* (x416)

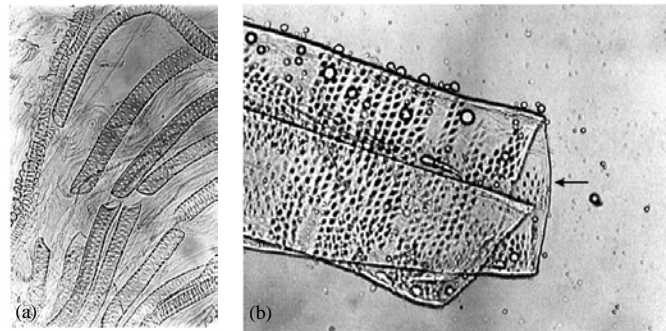


Fig. 4: (a) Reticulate thickening vessel in *E. aucheri* and (b) Pitted vessel in *E. granulata*. The arrow showing simple perforation plate

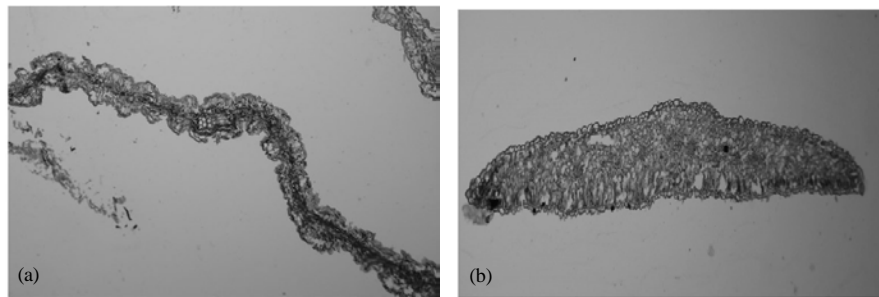


Fig. 5: (a) Isolateral mesophyll in *E. petiolata* and (b) Dorsi-ventral mesophyll in *E. helioscopia* (x416)

diffuse porous and radial chain pore. Finally, *E. aucheri* is the most advanced by having ring porous and cluster vessel. Also, isolateral and dorsi-ventral mesophyll were in mesophytic and xerophytic species. It sounds the variation in anatomy characters of studied species is related to ecologic factors.

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