

油桐和木油树核型的研究*

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关键词: 油桐属; 油桐; 木油树; 核型

油桐 *Vernicia fordii* (Hemsl.) Airy-Shaw (*Aleurites fordii* Hemsl.) 和木油树 *V. montana* Lour. (*A. montana* (Lour.) Wils.) 为大戟科油桐属 *Vernicia* Lour. 植物, 全世界共3种, 上述两种为原产我国的重要木本油料植物, 长江以南各省(区)广为栽培。

细胞学方面, 这两个种的染色体计数有过不少报道, 均为 $n=11$ [2,3,5]。本文旨在提供这两种植物核型比较分析的资料, 以冀有助于它们选种育种工作。

一、材料与方法

油桐采自浙江林学院苗圃七年生植株枝条顶部的混合芽; 木油树采自亚热带林研所十七年生植株枝条顶部的混合芽。凭证标本分别存浙江林学院和亚热带林研所标本室。

从混合芽内剥取生长锥, 用常规压片法制片。核型分析用放大照片测量染色体长度, 染色体命名按 Levan 等标准 [4]。

二、结果与分析

从油桐的100张制片和木油树的50张制片中, 各观察了100个以上细胞进行染色体计数, 结果表明两者茎尖体细胞的染色体数目均为 $2n=22$, 未发现非整倍性变异和多倍现象, 也未见B染色体(图1), 与过去学者的报道相符 [2,3,5]。核型分析各测量了7个分散良好, 着丝点清晰的中期细胞染色体, 结果如表1和图2, 3所示, 按 Levan 等 [4] 的命名系统, 这两个种的染色体组成均为 $2n=22=22m$, 而且染色体的臂比都小于2, 属于 Stebbins [6] 对称核型中之最整齐的“1A”型。

比较油桐和木油树的核型, 有以下主要差异: (1) 次缢痕的有无: 油桐第5对染色体的长臂上具有次缢痕, 且稳定。而木油树的染色体则未发现有次缢痕; (2) 染色体长度的差异: 油桐染色体组分的相对长度变异幅度为 6.49—11.87, 相对长度差值为

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5.38,而木油树染色体组分的相对长度变异幅为6.92—11.63,相对长度差值为4.71,前者是后者的1.4倍;(3)染色体臂比的差别:油桐的染色体臂比幅为1.09—1.62,臂比差值为0.53,而木油树的臂比幅为1.12—1.30,臂比差值为0.18,前者为后者的1.92倍,由此可见,油桐和木油树的核型尽管差别不大,但从臂比的差值来看,前者不及后者来得整齐,从而说明油桐具有比木油树进化的趋势。

油桐和木油树无论在形态、解剖上^[1],还是在核型上都非常近似,说明两者的亲缘关系十分密切。油桐是个栽培种,迄今未发现自然分布的群体。这种植物的起源不外乎两种可能:(1)起源于已灭绝的野生油桐;(2)起源于木油树,经过我国人民对木油树的历史悠久的选种和人工栽培而衍生的。后一种可能性也许比前一种更大。

表1 核型分析结果

Table 1 Results obtained from karyotype analysis

种 名 Taxon	染色体编号 Chromosome No.	染色体相对长度(%) Relative length of chromosomes			臂 比 Arm ratio 长臂/短臂 Long arm/ Short arm	染色体类型 Classification	备 注 Notes
		长 臂 long arm	短 臂 short arm	全 长 total length			
油 桐 <i>Vernicia fordii</i>	1	6.72	5.15	11.87	1.30	m	长臂上具有 次缢痕
	2	6.12	4.96	11.08	1.23	m	
	3	6.12	4.44	10.56	1.38	m	
	4	5.56	4.33	9.89	1.28	m	
	5	5.75	3.54	9.29	1.62	m sc	
	6	4.85	4.18	9.03	1.16	m	
	7	4.70	3.81	8.51	1.24	m	
	8	4.59	3.54	8.13	1.29	m	
	9	4.14	3.73	7.87	1.11	m	
	10	3.77	3.47	7.24	1.09	m	
	11	3.58	2.91	6.49	1.29	m	
木 油 树 <i>Vernicia montana</i>	1	6.42	5.21	11.63	1.23	m	
	2	5.86	5.11	10.97	1.15	m	
	3	5.56	4.71	10.27	1.18	m	
	4	5.16	4.51	9.67	1.14	m	
	5	4.86	4.31	9.17	1.13	m	
	6	4.66	4.16	8.82	1.12	m	
	7	4.61	4.01	8.62	1.15	m	
	8	4.51	3.81	8.32	1.18	m	
	9	4.36	3.71	8.07	1.18	m	
	10	4.06	3.46	7.52	1.17	m	
	11	3.91	3.01	6.92	1.30	m	

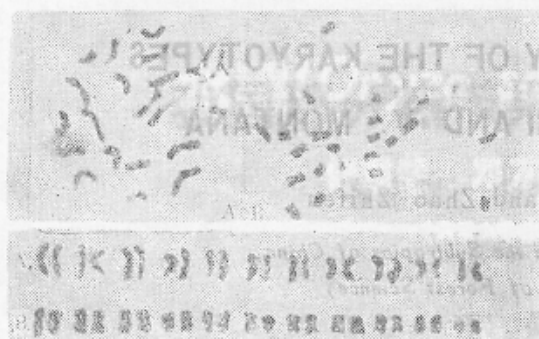


图1 茎尖体细胞中期示 $2n=22$
Fig. 1 Growing tip metaphase
showing $2n=22$

A. 油桐 *Vernicia fordii*
B. 木油树 *V. montana*

图2 核型 Fig. 2 Karyotype

A. 油桐 *Vernicia fordii*
B. 木油树 *V. montana*

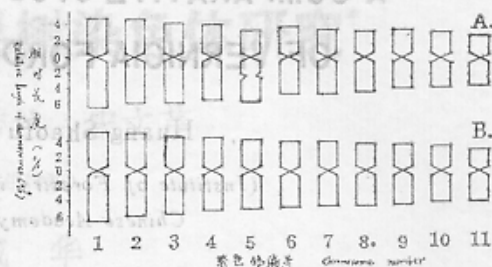


图3 核型模式 Fig. 3 Idiogram

A. 油桐 *Vernicia fordii*
B. 木油树 *V. montana*

参 考 文 献

- [1] 吴翰、杨秉耀、罗秋兰, 1983, 油桐属 *Vernicia* Lour. 与石栗属 *Aleurites* Forst. 叶的比较解剖观察. 华南农学院学报, 4(3), 58-61.
- [2] Bedi, Y.S., S.S. Bir and B.S. Gill, 1980, In chromosome number reports LXVII. Taxon, 29, 353-355.
- [3] Fedorov, A.A., 1974, Chromosome Numbers of Flowering Plants. Reprinted by Otto Koeltz Science Publishers.
- [4] Levan, A., K. Fredga and A. A. Sandberg, 1964, Nomenclature for centromeric position on chromosomes. Hereditas, 62, 201-220.
- [5] Mehra, P.N. 1976, Cytology of Himalayan Hardwoods. Sree Saraswaty Press, Calcutta.
- [6] Stebbins, G.L., 1971, Chromosomal Evolution in Higher Plants. Edward Arnold (Publishers), London.

Key words: *Vernicia fordii*, *V. montana*, Karyotype, Idiogram

A COMPARATIVE STUDY OF THE KARYOTYPES OF *VERNICIA FORDII* AND *V. MONTANA*

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Abstract

Vernicia fordii (Hemsl.) Airy-Shaw (*Aleurites fordii* Hemsl.) and *V. montana* Lour. (*A. montana* (Lour.) Wils.) (Euphorbiaceae) are two Chinese important tung oil trees widely cultivated in the regions south of the Yangtse River. They are very similar to each other both in morphology and in anatomy[1]. A comparative analysis of the karyotypes were carried out in order to shed some light on the phylogenetical relationship between the species in question.

The number of chromosomes in growing tip cells of shoots of both species is found to be 22, consistent with the reports of Mehra[5], Bedi and al.[2] and other authors[3]. According to the terminology defined by Levan and al.[4], the karyotype formulae are both $2n=22=22m$. In the light of Stebbins'[6] classification of karyotypic asymmetry, both karyotypes belong to "1A" type and should therefore be considered as very primitive ones.

But there are a few minor yet notable differences between the two karyotypes: (1) the constant occurrence of a secondary constriction on each of the long arms of the 5th pair of chromosomes in *V. fordii*, but absent from *V. montana*; (2) the differential value of relative length of chromosome set of *V. fordii* (5.38) being 1.4 times as much as *V. montana* (4.71); and (3) the differential value of arm ratio of *V. fordii* (0.53) being 1.94 times as much as *V. montana* (0.18). These data show that the karyotype of *V. fordii* is to some extent less symmetrical than *V. montana*, and should therefore be considered as phylogenetically more advanced than the latter.

Since plants of *V. fordii* have hitherto never been found in natural conditions, it is suggested that the species may probably be a derivative of *V. montana* over a long historical period of artificial selection and cultivation by ancient Chinese people.

Key words: *Vernicia*; *V. fordii*; *V. montana*; Karyotype