

Intergeneric Hybridization of *Helianthus annuus* L. and *Carduus acanthoides* L.

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Abstract

Carduus acanthoides L. (spiny plumeless thistle) is a perennial wild species with $2n=22$ chromosomes. Using this plant and *Helianthus annuus* L., an intergeneric hybrid was made. After crossing, it was established that *C. acanthoides* pollen germinated on the stigmas of sunflower lines HA 89A at 48 hours. The crossability rate was low, but seed was set and hybrid plants obtained. The F_1 plants strongly resembled the cultivated sunflower in the most important bi-morphological characters even though they had an intermediate type of heritability. The hybrid nature was confirmed through cytological and RAPD methods. The polymorphism between *H. annuus* and *Carduus acanthoides* and their F_1 -hybrids was studied using RAPD. The result showed introgression of *C. acanthoides* in the hybrid progeny. It was established that the spiny plumeless thistle carried R_f genes for CMS PET-1. As a result, self-pollination and sib-pollination of the F_1 plants and back-crossing with cultivated sunflower, F_2 , BC_1 and hybrid progenies were obtained. Some of the new lines were included in a breeding program for developing heterotic sunflower hybrids for the market.

Key words: *Carduus acanthoides*, sunflower, cytology, intergeneric hybridization, RAPD

一年生向日葵与 *Carduus acanthoides* L. 的杂交

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摘要

Carduus acanthoides L. (spiny plumeless thistle) 为多年生野生种 ($2n = 22$)。将该材料与一年生向日葵杂交。杂交 48 小时后, 将落在 HA89 品系柱头上的 *C. acanthoides* 花粉进行固定。二者杂交亲和力很低但可获得种子和杂交植株。尽管具有中等遗传力, 但 F_1 代植株最重要的生物形态特征非常类似于栽培向日葵。它们的杂种性质通过细胞学和 RAPD 方法得到了验证。利用 RAPD 方法研究了一年生向日葵、*Carduus acanthoides* L 与其 F_1 代杂交种之间的多态性并在杂交后代中检测到 *C. acanthoides* 的基因渗入。*C. acanthoides* 野生种具有恢复 CMS Pet-1 的 Rf 基因。 F_1 代通过自花授粉, 姊妹交以及与栽培向日葵回交, 可以获得 F_2 , BC_1 和后代杂种。一些新的品系已被用于育种体系中用来培育市场上需要的向日葵杂交种。

关键词: *Carduus acanthoides* L. 、向日葵、细胞学、种间杂交、RAPD