

胚乳发育对棉花种间杂种形成的关键作用

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摘要 本试验检查了陆地棉和中棉正反交情况下胚乳发育的状况, 并论证了胚乳发育的好坏对杂种胚的成长起着关键作用。试验表明对杂交铃外施植物激素, 能在很大程度上促进胚乳的发育, 而胚乳的良好发育又促进了胚的分化和成长。因此, 认为从调整杂交铃的内源激素的代谢着手, 能够成为克服种间杂交不亲和性的突破口。

关键词

分类号

The Significant Effect of Endosperm Development on the Interspecific Hybrid Formation of Cotton

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Abstract

By spraying phytohormones on hybrid boll in the species hybridization of cotton, it is proved that the boll-setting percentage, ovule size and embryo development etc. would be promoted significantly.

The purpose of this experiment is to explain the relationship between the exogenous phytohormones, endosperm development as well as embryo development. Three pollination treatments were used. They were: (i) Keyi No.2 (AD1) selfed, (ii) Keyi No.2 × Wantzu (A2), (iii) Keyi No.2 × Wantzu + GA3 50 ppm + NAA 40 ppm, 5 sprays for each. The ovules were dissected and measured on the 3rd, 5th, 7th, 9th, 11st, 21st, 31st, 41st day after pollination. Experimental results are shown as follows:

(1) During the early stage of endosperm development, we found that spraying phytohormones could increase the mean number of free nuclei in the embryo sac as compared with the non-spraying groups (see Table 1, Plate I, 2, 5).

(2) The effects of exogenous phytohormones were more apparent at the 21st, 31st and 41st day after pollination. For example, on the non-spraying group, the number of ovules with "normal or nearly normal endosperm" was 0-4, averaging 3.1 from 100 pollinations, while under the condition of GA3 and NAA spraying it was 73.1-195.2, averaging 115.3, which is 37 times the number of the former. At the same time, the number of normally differentiated embryo increased about 40 folds (see Table 3).

(3) Among 151 ovules with large quantity of endosperm examined, some (8.6%) were without embryo, which might be due to their single fertilization origin or the proembryos that had lost their physiological function of absorbed endosperm and died at the very early stage (Plate II, 7). Although there were some embryo-less ovules, there were still more than 90% ovules with both endosperm and embryo (Table 3, Plate II, 2, 6, 9), and there might have been a high correlation between the two.

(4) Endosperm plays an important role in the hybrid embryo formation. A lack of physiological function of the endosperm would cause the an unbalanced distribution of nutrients. By spraying with phytohormones the metabolism function of hybrid endosperm and embryo could be improved. It is possible that as the phytohormones entered the embryo sac, the enzymatic system which was related with the development of embryo and endosperm were activated. Thus, the nutrients of maternal tissues (nucellus integument, ovary) could enter the developing embryo, thereby, the incompatibility of interspecific hybridization was in some degree overcome.

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