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Advances In Agronomy, Plant Breeding and Horiculture

Editorial

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The application of genetics to plant breeding

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DESCRIPTION

Plant breeding is the application of genetic principles to create plants that are more useful to humans. This is achieved by selecting plants that are economically or aesthetically needed, first by controlling the mating of selected individuals, and then selecting specific individuals from the offspring. This process, repeated over multiple generations, can change the heredity and value of plant populations, far beyond the natural limits of previous populations.

APPLICATIONS

Increase production

One of the goals of almost every breeding project is to increase production. This can usually be done by choosing obvious morphological variants. An example is the selection of dwarf early-maturing rice varieties. These dwarf varieties are robust and have higher grain yields. In addition, their early maturity quickly clears the land, and it is usually possible to plant additional rice or other crops in the same year. Another way to increase yield is to develop pest-resistant varieties. In many cases, the development of resistant varieties is the only viable pest control method. Perhaps the most important characteristic of resistant varieties is their stabilizing effect on production, which has an impact on a stable food supply. Drought-tolerant, heat-resistant or cold-tolerant varieties provide the same benefits.

Distribution and physical changes

Another common goal of plant breeding is to expand the cultivation area of a crop variety. A good example is the improvement of grain sorghum since its introduction in the United States in the 1750s. Red sorghum native to the tropics is mainly limited to the southern plains and southwest, but earlier mature varieties have been developed. Now red sorghum is an important crop north of North Dakota. When growing ornamental plants, pay attention to factors such as longer flowering time, improved flower durability, general frugality, and other features that contribute to practicality and aesthetics. Novelty itself is often a virtue of ornamental plants, often pursuing magnificence and even strangeness.

Plant evaluation

Evaluates the value of plants so that breeders can decide which individuals should be discarded and which individuals will allow the next generation to produce. Some traits are more difficult than others.

Qualitative features

It is easiest to deal with features or traits that contain discrete or qualitative differences determined by one or several major genes. There are many of these genetic differences, and they usually have a profound impact on the value and use of plants. For example, starchy grains and sugary grains in green beans (characteristics of field or sweet corn) and decisive and unlimited growth forms (deterministic varieties are suitable for mechanical harvesting). This difference is easy to detect and quickly assess, and the expression of characteristics remains unchanged regardless of the environment in which the plant grows. It is said that this characteristic is highly heritable.

Quantitative characteristics

However, in other cases, plant characteristics go from one extreme to the other in a continuous series and cannot be divided into separate categories. This variability is called quantification. Many economically important features belong to this type; B. Height, cold and drought tolerance, maturity time, especially

yield. These characteristics are determined by many genes, and each gene has a small effect. Although the distinction between the two types of traits is not absolute, it is still useful to refer to qualitative traits as traits with discrete differences and quantitative traits as traits with a hierarchical sequence.