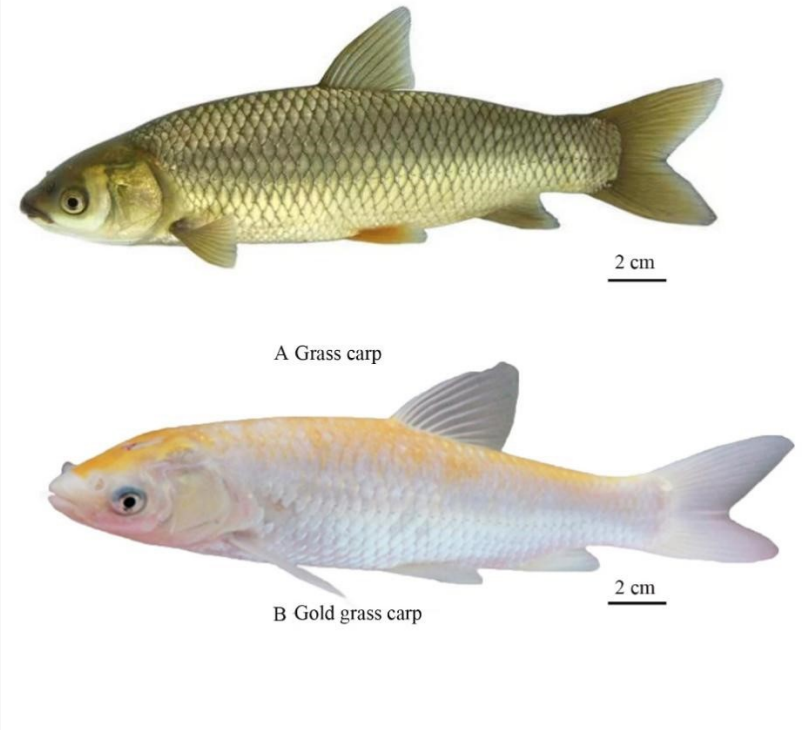
Improvement and application of genetic resources of grass carp (Ctenopharyngodon idella)

USA, August 16, 2024 /EINPresswire.com/ -- Grass carp is one of the most productive freshwater fish and plays an important role in ensuring protein supply. This paper reviews the main research achievements of grass carp, such as morphology, cytogenetics, molecular population genetics and so on. This paper not only introduces the key application of genetic improvement technology such as gynogenesis technology, cross breeding technology and polyploid breeding technology in grass carp, but also discusses the protection measures of grass carp germplasm resources. On this basis, we put forward a new method to strengthen the protection of grass carp germplasm resources, cultivate high-quality grass carp varieties, and promote the sustainable development of grass carp industry.



Picture of Grass carp and Russian gold grass carp, Bar = 2 cm.

Grass carp (Ctenopharyngodon Idella) is an important economic fish for freshwater aquaculture, with the total global output of grass carp in 2023 standing at 5,941,315 million tons. The exploring and utilization of high-quality grass carp germplasm resources are important for ensuring a domestic supply of high-quality aquatic protein.

In a review paper (https://doi.org/10.1016/j.repbre.2024.04.003) published by the KeAi journal Reproduction and Breeding, a team of researchers from Changsha, China, summarizes major research results of grass carp in morphology, cytogenetics and molecular germplasm resources genetic improvement and so on. The key findings are as follow.

□1□Origin and geographical of grass carp
Grass carp had been farmed in China for more than 1,700 years and was commonly referred to as “wan”, “wanyu”.

□2□Distribution of germplasm resources of grass carp
Grass carp was originally distributed in China, Russia, and Bulgaria. In China, it mainly inhabits the Yangtze River, the Pearl River, and the Heilongjiang River. Grass carp had been introduced in 93 countries, with some countries directly importing it from China, India, Hungary and the United States, among others. Malaysia was one of the earliest countries to import grass carp from China in the 1980s.

□3□Genetic improvement technology of grass carp
The genetic improvement technology of grass carp focuses on three points:

Studies on gynogenesis of grass carp
The common grass carp is prone to enteritis, rotten gills and hemorrhaging diseases. The gynogenesis grass carp was improved by the gynogenesis techniques, and a large number of improved grass carp was obtained by backcrossing the gynogenesis grass carp with the common grass carp. The improved grass carp has excellent characteristics such as strong disease resistance, fast growth rate, strong vitality and orderly size.

Studies on hybrid breeding of grass carp
At present, hybrid breeding played a significant role in hybrid variety improvement and variety cultivation in aquaculture. To enhance the grass carp’s disease resistance and cultivate new hybrid varieties of grass carp, Chinese aquaculture researchers had conducted numerous artificial hybrid breeding experiments taking grass carp as the parents, including intergeneric hybridization and intersubfamily hybridization.

Studies on polyploid breeding of grass carp
At present, the main technical means for grass carp are gynogenesis technique and hybridization technology, with a small amount of polyploid breeding. For example, fertilized eggs of grass carp induced with heat shock treatment produced a modest proportion of triploid grass carp.

□4□ Application and conservation measures of grass carp germplasm resources
There are two kinds of germplasm resources of grass carp; Chinese native grass carp and Russian golden grass carp. The collection, identification and preservation of grass carp germplasm offers a robust foundation for the cultivation of new species.

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