Japan, China and South Korea account for 84 percent of the macroalgae patents

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The algae, traditionally cultivated for the food sector, are accessible marine resources as they grow in coastal areas. These crops increase by 7.5% on average every year and have become an important part of marine aquaculture through the diversification of demand for products based on macroalgae for bioenergy, cosmetics and biomedicine.

This and other conclusions are deduced from a study led by the Spanish National Research Council (CSIC) that delves into the distribution of applications and products patents derived from macroalgae among countries all around the world. The work concludes that Japan, China and South Korea account for 84% of macroalgae patents, a figure that contrasts with that of other Asian countries such as the Philippines, Indonesia and Vietnam since they are also among the worldwide top producers of this type of algae.

The study, published in the journal *Nature Biotechnology*, analyzes the number of macroalgae patents registered between 1980 and 2009. The researchers have compared this distribution with the production capacity (tons produced per country) and the scientific effort involved in the study of their culture (number of scientific studies related to the aquaculture of these algae).

Despite the high production in some developing countries of Asia and Africa, the nations that invest effort in research –such as Japan, China and South Korea– are the ones that hoard the patents. Countries like the U.S. and France lead the rest of the market, although they are not

producers. Inés Mazarrasa, CSIC researcher at the Mediterranean Institute for Advanced Studies emphasizes: "On the contrary, countries like the Philippines or Indonesia, major producers but with a low investment in research, have not registered patents".

CSIC researcher specifies: "Before the study, we expected that, given its greater accessibility, the macroalgae patents market was more evenly distributed among producing countries. Moreover, the increase in demand for new macroalgae products and applications could open a chance for traditional producing countries to benefit from their macroalgae production capacity".

The study highlights the role of research as an engine of biotechnological development and opens a new avenue for cooperation with the developing countries that have traditionally been macroalgae producers. CSIC researcher states: "Scientific collaboration and investment is essential for enhancing a production of more sophisticated products and a sustainable development from their own natural resources, as the

Convention on Biological Technology promotes. If it doesn't occur, these countries would stay once again out of an emergent market despite dominating the production of the raw material in favor of other nations, who would end up taking a greater benefit by patenting derived processes and products".

Although the rate of discovery of new marine species is low (0.93% per year), the number of domesticated marine species increases at a rate of 3% annually. The number of natural products of marine origin -such as cosmetics, industrial enzymes or genes derived from organisms- and ocean genes patents increase, respectively, at a rate of 4% and 12% every year.

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