

Abstract of Presentation

Note: This paper should be typed in “Times New Roman” of 12pt.

Name (Underline the family name)

Atsuhiko Shinmyo

Presentation Title(Should be no more than 20 words):

Plant biotechnology, a key technology in the 21st century

Abstract :

Plant biotechnology is a most important technology to protect global warming. Solar and wind batteries cannot decrease CO₂ in atmosphere, but plant can fix CO₂ and convert it to biomass. Annual emission of CO₂ to the atmosphere from fossil resources is 6.5 billion tons of carbon. On the other hand, plant biomass in the world is 650 billion tons of carbon, and 90% of plant biomass is accumulated in woods. If 1% of plant biomass is increased in a year, all CO₂ evolved in the year is fixed. Plants convert 0.1% of solar energy reached on the surface of the earth to biomass energy every year.

How, can we increase 1% of plant biomass per year in the world? Plants, which cannot move in a whole life, are exposed to various biotic and abiotic environmental stresses, and plant productivity is significantly reduced from the maximum value. Molecular breeding is a strong power to recover the reduction of productivity of plants. Commercial transgenic plants, such as corn, soybean, canola, and cotton, with herbicide-resistance and insect-tolerance, were produced in these 10 years. Eucalyptus with salt-tolerance and acidic soil-tolerance by recombinant DNA technology was established by Japanese industries. Agricultural land is about 13% of whole land on the earth and more than half of the agricultural land is unsuitable for plant growth, because of acidic soil, alkaline soil, and salinity. Development of drought-resistant plant is required, since 30% of whole land on the earth is dry land. It will be possible to increase the land for agriculture and forestry by recombinant DNA technology in a short period.

Recombinant DNA technology can also be applied to increase the productivity of plants, such as CO₂ fixation, growth rate, and early flowering. When fructose bis-phosphatase gene was introduced to tobacco protoplasts, rate of CO₂ fixation and biomass production of tobacco increased 80%, and a similar result was obtained in potato (Yokota, et al). Development and improvement of the recombinant DNA technology to plants will establish the sustainable world.