Methods for Data Encoding in DNA and Covert GMO Authentication

Description of Technology

The dramatically increasing worldwide utilization of genetically modified plants, animals and microbes (GMOs) presents challenges to ensure the security, authenticity and validation of certain material goods. GMOs are not tamper proof, so it is necessary to encode and embed cyber-security data within the GMO genome. Watermarking and other cryptographic methods are available which conceal and recover the original signature, but in the process they reveal the authentication information.

Researchers at the University of Wyoming have developed a protocol that embeds the authentication string indistinguishably from a random element in the signature space and the string is verified or denied without disclosing the actual signature. The algorithm effectively camouflages the required authentication and/or tracking data to ensure that an adversary cannot identify the signature as a security or watermarking feature. In case of some error, the process is reversible.

Applications

• The resulting sequence construct may be inserted into the GMO genome using established genetic engineering technologies so that is is stably inherited through generations.
• The protocol is secure in terms of standard cryptanalytic tools, and integrates advances electronic signature methods with a new watermarking or data-embedding technique.

Features & Benefits

• Creates security for the authentication code:
  o The authentic signature is indistinguishable from random elements in the signature space and the authentication string can be confirmed or denied without disclosing the actual signature.
  o The signature key allowing decoding and authentication is not revealed during this process, thus allowing continued utilization of the key.
  o Authentic signature clones may be identified via PCR by the legitimate owner of the signature or by a designated judge.
• The signature data is not strictly limited in sequence size and may include, but are not limited to, security details, the product production and distribution chain and company licensing details.