

Industrial Application with Protected Horticulture in Korea

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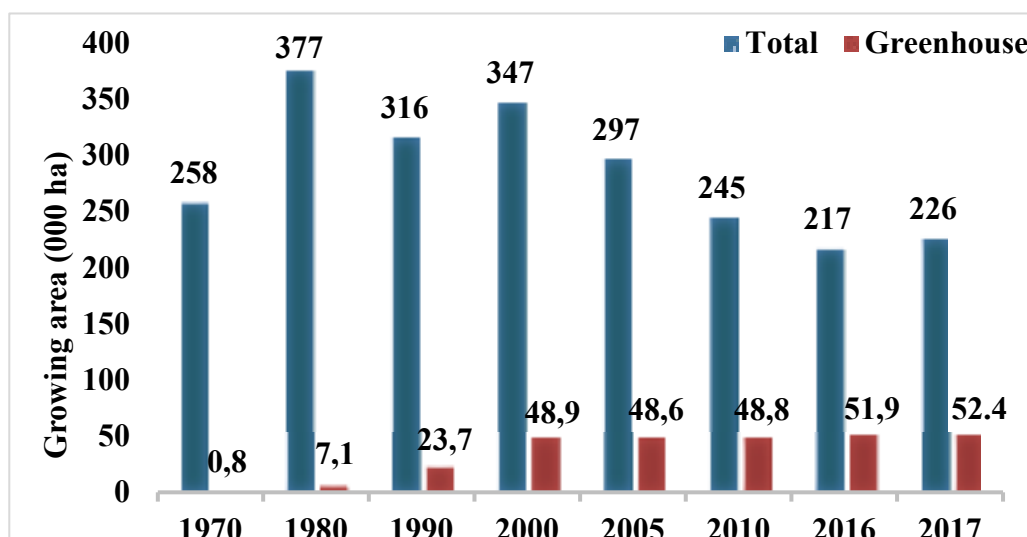
Abstract.

From 1970's protected horticulture industry in Korea has developed rapidly until 2000 with government support and efforts of farmers. Recently, Korean agriculture has faced difficulties both internally and externally but still the area of greenhouse has increased. In order to overcome the challenges surrounding agriculture, rural development of administration (RDA) played a key role in improving agricultural productivity through modernization of greenhouse, development of automation equipment for labor saving, energy saving technology, and development of smart farm using ICT technology with farmers and researchers. This paper will introduce present condition of protected agriculture in Korean and ICT technology from Korea.

Discussion

From 1960, through the 'Green revolution' Korean agricultural industry grow rapidly. But at that time still have problem because there are four seasons in Korea. People can grow limited crops that can survive during winter season. After plastic film introduced to Korea in 1970, people tried to apply it agricultural industry and from the middle of 1970's greenhouse area increased rapidly till 2000 (Fig.1).

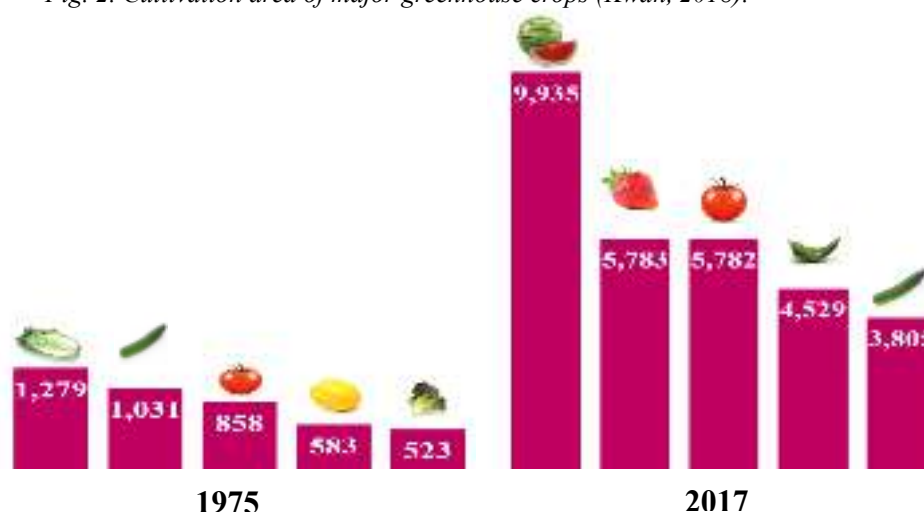
Fig. 1. Changes total growing & greenhouse area in Korea (MAFRA, 2018).



The land covered by plastic houses looks white so people call it 'White revolution' (Seo et al., 2013). During more than two decades trend in greenhouse industry in Korea has changed. For example major crops are substituted from

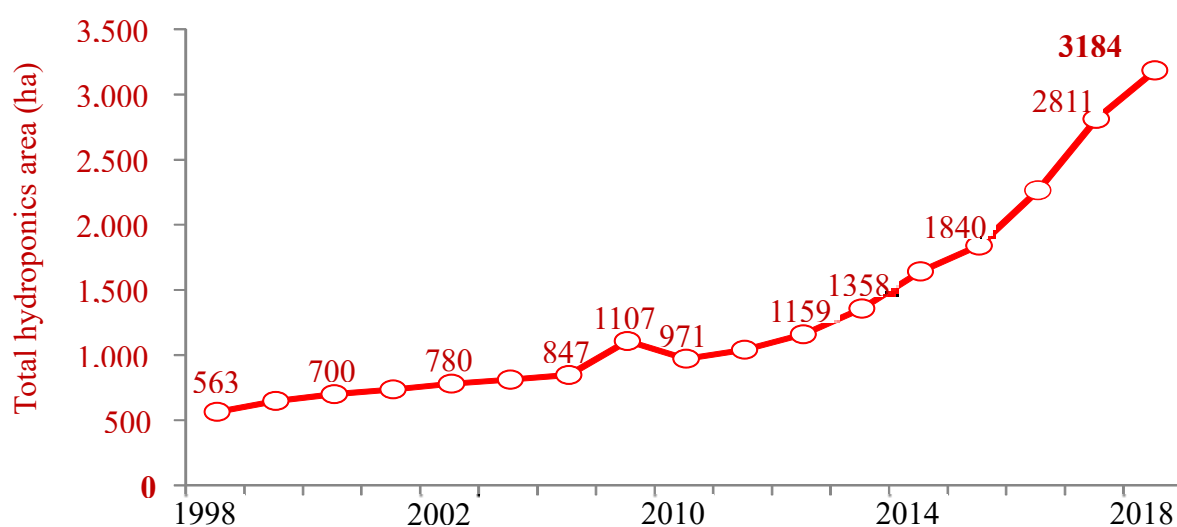
vegetables to fruits (Fig. 2).

Fig. 2. Cultivation area of major greenhouse crops (Kwan, 2018).



People can not only take advantages from greenhouse but also have problems. Under the green house condition, occurrence of disease originated from soil and salt stress have increased. At first people used grafting that one of methods, and it is still popular, people tried to apply hydroponic system to get more safe food (Fig. 3).

Fig. 3. Changes in hydroponic cultivation area of horticultural crops (Kwan, 2018).



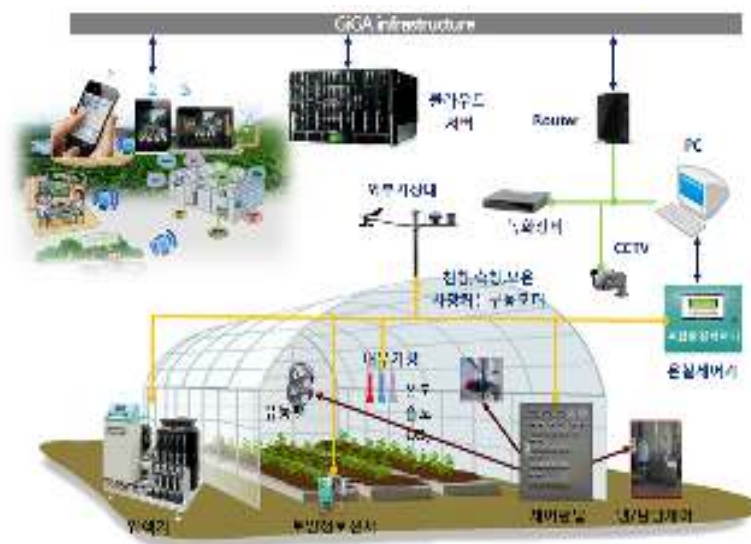
Additionally to overcome various condition like heat, frozen, humid, dry, people adopt heating & cooling system, but mostly the principal of operation derived from foreign country (Fig. 4.)

Fig. 4. Heating & Cooling system in Korea.



Recently, Korean agriculture has faced difficulties both internally and externally problem, like abnormal climate, price competition, high labor fee and cost for agriculture, and so on. So people in Korea try to the concept by small scale in agricultural field with plant factory (Kim, 2010), smart monitoring system (Kang et al., 2010), or environment control system based on deep learning (Shin, 2018), (Fig 5).

Fig. 5. Example of smart farm monitoring system.



On the other hand, try to adopt new light source LED which has long life period and low requirement of electricity (Hong, 2012), (Lee et al., 2014).

Fig. 6. Treatment of day length extension using by conventional incandescent (left) and red LED lighting device (right) in perilla at plastic house (Hong et al., 2012)



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