Breeding leafy vegetable cultivars for summer

A NEW AMARANTH cultivar, “Tai-nong No. 1” has been released recently by the Taiwan Agriculture Research Institute. It has characteristics of disease resistance, early maturity, cold tolerance, and high yield. A major problem in cultivating amaranth during the summer in Taiwan is white rust, a fungal disease caused by Albugo blitium Kuntz. The new cultivar “Tai-nong No. 1” had a lower incidence of disease, both in the field and after inoculation by spraying a suspension of zoosporangia. The disease ratio of the control was 100%, while in “Tai-nong No. 1” it was only 5 – 10%. The disease index of the control was 84%, compared to only 2% in “Tai-nong No. 1”.

The cultivation period of local amaranth cultivars is usually 21 days in summer. “Tai-nong No. 1” can be harvested after only 18 days, a reduction of the cultivation period of 14%. This is very important when crops are being grown after typhoons or flooding in summer. In March, which is towards the end of winter in Taiwan and cool, “Tai-nong No. 1” grew faster than the local red and white cultivar, and could be harvested after ten days. If “Tai-nong No. 1” was given the same cultivation period as the local cultivar, its yield was three times higher because of its faster growth rate.

News source: Taiwan Agricultural Research Institute, Taiwan ROC
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Use of degradable materials in the cultivation of horticultural crops

THE TAINAN District Agricultural Improvement Station began in 1991 to evaluate the feasibility of using degradable plastic films for the production of horticultural crops. Products from China, Korea, Japan, Israel, Germany, United States and Taiwan were used for comparison.

The results were as follows: No difference was observed over nine consecutive years in yield as well as the content of heavy metals (iron, lead, nickel, copper, cadmium and chromium) in the edible parts of cabbage, mustard and head lettuce that grew in the soil which contained the disintegrated remains of the PE films. The same results were also obtained in trials of musk melon and paddy rice over six consecutive years.

Biodegradable plastic (including UPEC, Bio Multi B, Eco Green B, Cell Green multi, Kiemaru, Mater-Bi, Novon and ECM) were adopted as mulching materials for crops of musk melon, cherry tomato and cabbage. The results indicated that no differences were found in the growth and yield when different mulching films were used.

Biodegradable rubbish bags incorporated into different kinds of organic wastes were composted and evaluated. The results indicated that biodegradable trash bags could be incorporated with household, yard or fruit-vegetable wastes, and fermented in a composting plant for 2-3 months or longer. All of the biodegradable trash bags had degraded completely after 50 days. All of the final products (organic compost) were good in quality, and promoted the growth of leafy vegetables.

News source: Tainan District Agricultural Improvement Station, Taiwan ROC
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Producing disease-free tubers of calla lily

CALLA LILIES (*Zantedeschia* spp.) are grown and marketed as cut flowers and pot plants, because of their attractive spathe. It is believed that calla lily has the potential to be an important bulb crop in Taiwan. The Taiwan Seed Improvement and Propagation Station (TSIPS) began to develop a production system for healthy tubers in 1996. The major activities of this program included micropropagation and tuber production.

The most common viruses that infect the calla lily are cucumber mosaic virus (CMV) and dasheen mosaic virus (DsMV). Viruses can be eliminated from calla lilies by shoot-tip micropropagation. Heat treatment combined with shoot-tip culture is an effective way of eliminating virus from many crops.

In the case of calla lily, however, it is not necessary to eliminate virus by heat pretreatment. Plantlets free of CMV and DsMV can be obtained by culturing apical buds 2 - 4 mm long in MS medium, supplemented with myoinositol, thiamine and BA. In addition to being free of virus, tissue culture-derived seedlings are alternative materials for the production of flowering-size tubers.

However, balancing the rate of multiplication and the size of plantlets in a tissue culture system is important in establishing an efficient system of tuber production. It was found that tuber size was influenced by the size of the plantlet and its cultural condition (i.e. planting density and fertilization program). Our results showed that larger seedlings tended to produce larger and heavier tubers. The largest tuber size was obtained at a plant density of 176 plants/m². The medium should be supplemented with applications of liquid fertilizer (20 - 20 - 20 N-P-K) every two weeks. These results showed that it is possible to increase the tuber size if a proper cultural technique and high-quality seedlings grown by tissue culture are used.

News source: Taiwan Seed Improvement and Propagation Station, Taiwan ROC.

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"On site" diagnosis of nitrogen fertility to find nitrogen fertilizer requirements of leafy vegetables

LEAFY VEGETABLE crops often receive heavy nitrogen applications. To avoid contamination of the environment with nitrate or nitrite, we need quick test methods for available soil N, to use for on-site diagnosis and fertilizer recommendations in leafy vegetable fields. In laboratory tests of incubation leaching and chemical extraction methods, the results indicated that the level of available N detected by chemical extraction of 10% KCl, hot KCl and hot water, showed a positive and significant correlation with the levels obtained by incubation leaching.

The relative yield of crops not given any nitrogen treatment reached 100%, when the N content detected by chemical extraction fell in the ranges 100 ppm, 150 ppm and 200 ppm. Moreover, in field and pot experiments, there was a highly significant linear relationship between the available N content and electric conductivity EC, 1:5 of the equations:

Where \( Y = 252.08X + 2.0063 \) \( n = 23, R^2 = 0.7643** \), from pot experiments, and \( Y = 250.39X + 0.2584 \) \( n = 22, R^2 = 0.6363** \), from field experiments. Here, \( Y \) was equal to the EC value; \( X \) was equal to the nitrate (NO\(_3\)-N) extracted by 10% KC1. Based on these results, on-site N diagnosis could be implemented in leafy vegetable fields, provided the necessary facilities were available. Growers could be recommended to withhold N fertilizer when the EC is higher than 0.4 ms/cm, suggesting a level of nitrate in the soil of more than 100 mg/kg. This may be found in plastic houses susceptible to salt problems, because of the high evaporation rate and lack of rainfall leaching, or in poorly drained fields where salts have accumulated.

When EC values fall to the ranges of 0.4 – 0.3 ms/cm, the N fertilizer rate should be reduced by three-quarters. At 0.3 – 0.2 ms/cm, the rate should be reduced by half, and at 0.2 – 0.1 ms/cm, the N fertilizer rate should be a quarters of the conventional rate cited in the Fertilization Handbook. If the EC is less than 0.1 ms/cm, the recommended N use should follow that in the Fertilization Handbook. However, the recommended rate of applied N based on rapid diagnosis should be adjusted and increased in fields which are well-drained, where the soil is subject to N losses from infiltration, or where there is a low soil organic matter of less than 3.0%. The dynamics of soil N are profoundly influenced by levels of soil moisture and soil organic matter. In summary, the rapid soil testing kit not only promotes the rational use of fertilizer, thus reducing production costs, but also helps to conserve the environment.

News source: Taiwan Agricultural Research Institute, Taiwan ROC.

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