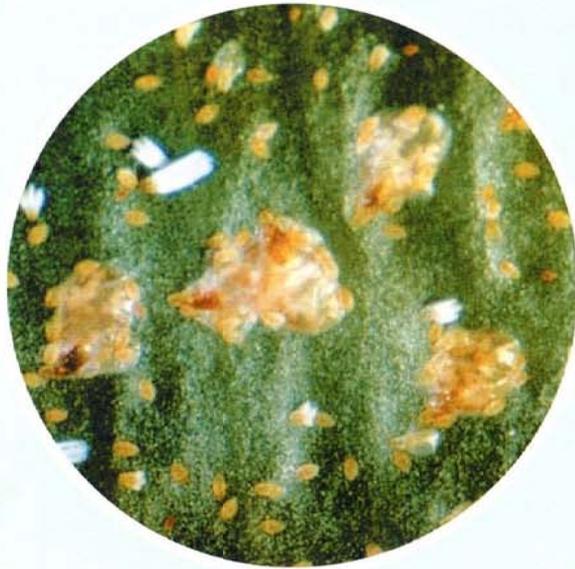


作物環境課

Crop Environment Section



植物保護

配合轄區產業發展與農業環境資源永續利用，植物保護之業務包括各項作物病蟲害之生態及綜合防治研究，非農藥防治技術，疫情偵測與監測，作物病蟲害預測、診斷及處方服務，農藥安全使用之輔導推廣等。

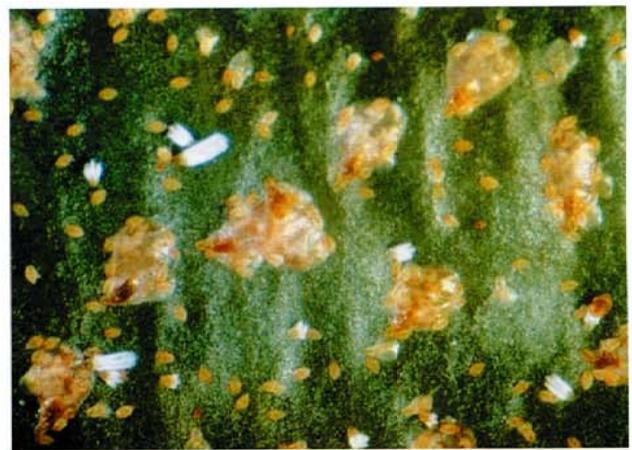
在作物病蟲害預測模式方面，歷年來已建立落花生葉斑病、大豆銹病及紫斑病、柑桔潰瘍病、水芋軟腐病及葉蟎、韭菜銹病及根蟎之發生預測模式，可有效預測病蟲害之發生，掌握適宜防治時機。

為配合安全及環保農業政策，致力於非農藥防治技術研究，利用氯化鐵防治小胡瓜露菌病、亞磷酸處理稻種防治水稻苗徒長病、氯化鐵及丁香油防治葉稻熱病、印楝素減少韭菜根蟎為害及洋香瓜白粉病以枯草桿菌改良劑等降低為害，並減少農藥的使用，成效良好。

在綜合防治技術方面，針對山蘇、山藥、金柑、薤菜主要病蟲害研究其生態並開發防治技術，利用馬拉松、苦楝油防治山蘇柚葉並盾介殼蟲，以益達胺、畢芬寧及免賴得、貝芬硫醃分別防治山藥黑盲椿及炭疽病，對金柑疫病、溫泉薤菜青枯病亦分別篩選出三元硫酸銅、達滅芬及嘉賜銅、酸性土壤改良劑等，可降低其為害發生。

推動宜蘭縣東方果實蠅全面進行共同防治，面積達3,100公頃，同時推動宜蘭縣三星鄉青蔥甜菜夜蛾全面共同生物防治，面積達400公頃，對減少果實蠅及甜菜夜蛾密度及為害率，成效卓著。同時週年進行農業氣象觀測應用分析並參酌中央氣象局資料發布本區農業氣象預報，提供資訊調整農事作業，以減少農作物因災害之損失。

為提高病蟲害防治管理效益與產品品質，維護消費者健康，極力輔導推廣轄區產銷班共84班有關農藥安全使用及申請使用吉園圃標章等工作，以生產安全蔬果，供消費者認明選購。



葉芽線蟲、柚葉並盾介殼蟲為山蘇之重要病蟲害 Foliar nematode (*Aphelenchoides fragariae*) and *Pinnaeus buxi* are the main pests on nest fern.

Plant Protection

To cope with the demands of agricultural development and sustainable utilization of resources in Hualien district, research activities of plant protection are focused on the studies of ecology, control measures, non-chemical management, and prediction, diagnosis and prescription of various crop diseases and insect pests. Emphases have also been laid on the detection and monitoring of epidemic status and the promotion of safe use of agricultural chemicals in the field.

Prediction models for diseases and insect pests such as peanut leaf spot, soybean rust and purple stain, citrus canker, taro seedling soft rot, leek rust and bulb mites have been established. These models can effectively predict the incidence of pests for in time control.

Non-chemical plant protection is beneficial to the safety of the public and the preservation of environment. Some examples of our research accomplishments are the prevention of downy mildew disease by ferric chloride in small cucumber, the Bakanae disease (*Gibberella fujikuroi*) by ferrous chloride in rice, and the blast disease by ferrous chloride and clove oil in rice. The damage caused by bulb mites can be lessened by azadirachtin and the damage caused by powdery disease can be decreased by the application of *Bacillus amyloliquefaciens* B190 improver. The non-chemical control measures can significantly reduce the amount of pesticides and fungicides used in crop production.

For integrated pest management, studies on the ecology and control measures of major insect pests have been conducted in nest fern, yam, kumquat, and water convolvulus.



黑盲椿、炭疽病為山藥重要之病蟲害 Mired bug and anthracnose disease are the main insect pests and diseases, respectively, on yam.

Measures recommended to the farmers include the application of malathion and neem to control *Pinnaspis buxi* in nest fern, imidacloprid and bifenthrin to control mired bug in yam, and benomyl and delan-C to control anthracnose disease in yam. For the control of blight disease in kumquat and bacterial wilt in water convolvulus, satisfactory results can be obtained by the application of tri-copper sulphate, dimethomorph, kasuran, and acidic soil improver.

The whole-scale prevention of oriental fruit fly, covering 3,100 hectares of farmland, has been conducted in Yilan County. Biological control of beet noctuid in green onion has also been carried out for over 400 hectares in the San-Shing area of Yilan County. These measures effectively decreased the pest population densities and the degree of damage to the crops. Scientists of this Station are also responsible for the year-round collection and analysis of agro-meteorological data. With helps from the Central Weather Bureau, this Station provides forecasting information to the farmers for adjusting the timing of farm operation and reducing damages caused by natural disasters.

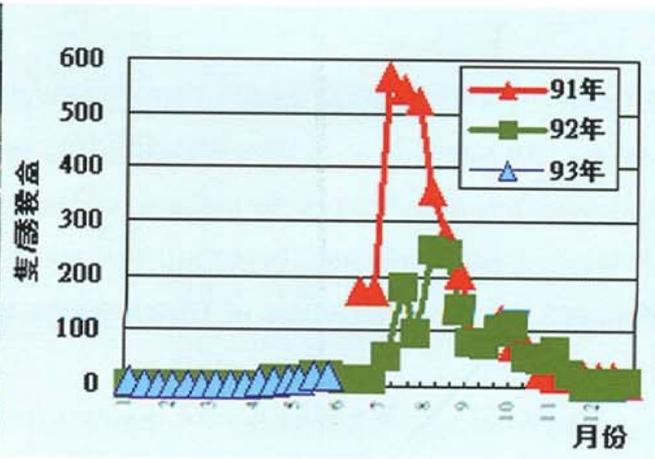
In order to improve the efficiency of pest management and the quality of agricultural products, this Station guides 84 production and marketing groups in Hualien district for safety use of chemicals and verification by GAP (Good Agricultural Practice) standards. Agricultural products, especially vegetables and fruits, bearing the GAP label is an indication of cleanness, safety and quality which is widely recognized by the consumers in Taiwan.



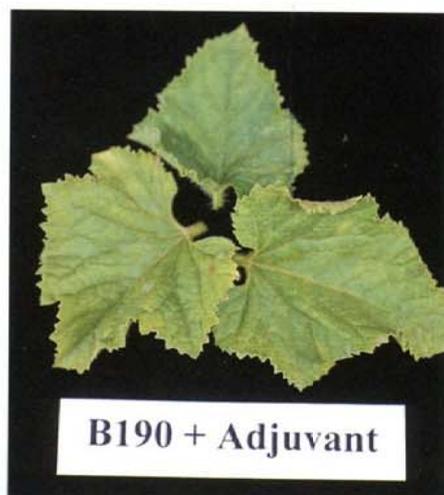
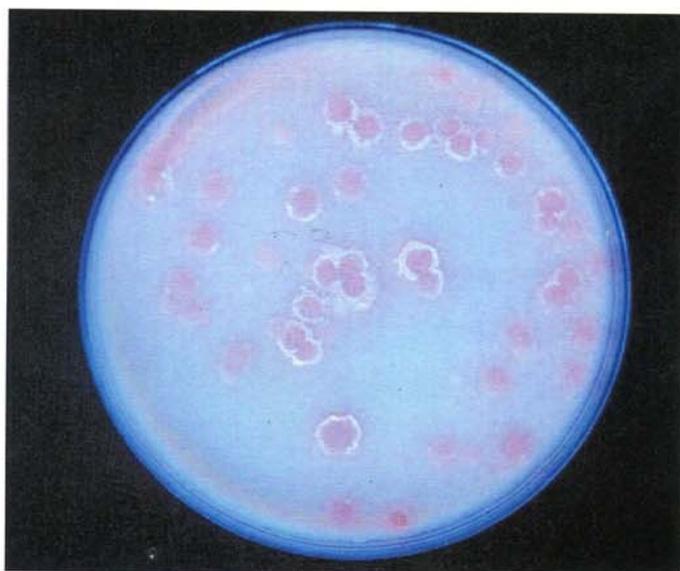
印楝素可有效抑制韭菜根蟻為害 Azadirachtin can effectively inhibit the leek bulb mites.



肉桂油可有效防治胡瓜露菌病 Cinnamon 0:1 can effectively prevent the downy mildew disease on cucumber.



全面懸掛果實蠅誘殺器防治效果良好 The prevention of fruit fly by hanging trap box is very effective.

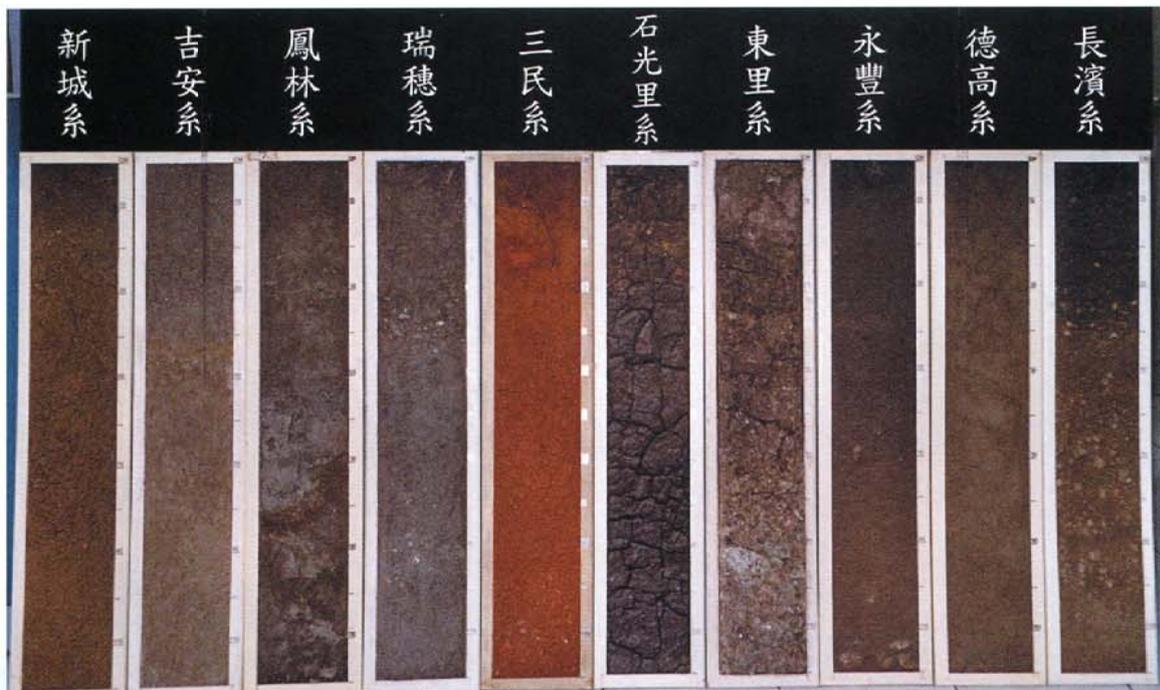


枯草桿菌可有效抑制洋香瓜白粉病 *Bacillus amyloliquefaciens* B190 can effectively inhibit the powdery mildew disease on muskmelon.

土壤肥料

花蓮及宜蘭地區之土壤受到母質及地形之影響，而呈現過酸、過鹼、微量元素缺乏及排水不良等程度不同的土壤問題，因此土壤肥料之工作目標即為研究此類土壤問題所引起之作物營養障礙的原因及改良方法，並透過土壤及植體之營養診斷服務，推薦合理的施肥方法，致力於有機及設施栽培管理技術及堆肥與栽培介質開發等之研究。

近年來之研究成果包括透過網格式土壤調查，建立花宜兩縣完整之土壤調查資料；並利用調查完成之資料對每一鄉鎮之農民進行「土壤特性及合理化施肥」講習，另外結合網際網路建立地區性之土壤資料查詢系統，提供農民迅速獲得資訊的管道。利用農業廢棄物製成具有耐用、低鹽分、通氣良好及價格便宜等優點的假堆稻殼介質，應用於瓜果類之栽培；另以雞糞-米糠-稻殼製成堆肥栽培小胡瓜，可增產20~30%，且其殘效可維持半年以上，可減少施用追肥。寒梅盆栽以壤土、真珠石、泥炭土混合製成之介質及覆蓋有機質肥料之處理，可有效提升寒梅之品質。利用葉面噴施氯化鉀及磷酸鉀溶液可明顯提高番石榴的甜度。以複合菌根菌、固氮菌、溶磷菌接種無子西瓜，有效促進西瓜之生長並提高養分利用效率。以不同輪作系統進行作物有機栽培，六年後「旱田-旱田」輪作栽培明顯地較「水田-旱田」輪作栽培表現較優的土壤營養供給能力及產量優勢。



花蓮地區各具特色之土壤立體剖面標本

The three-dimensional soil profile samples of Hualien district.

Soil and Fertilizer

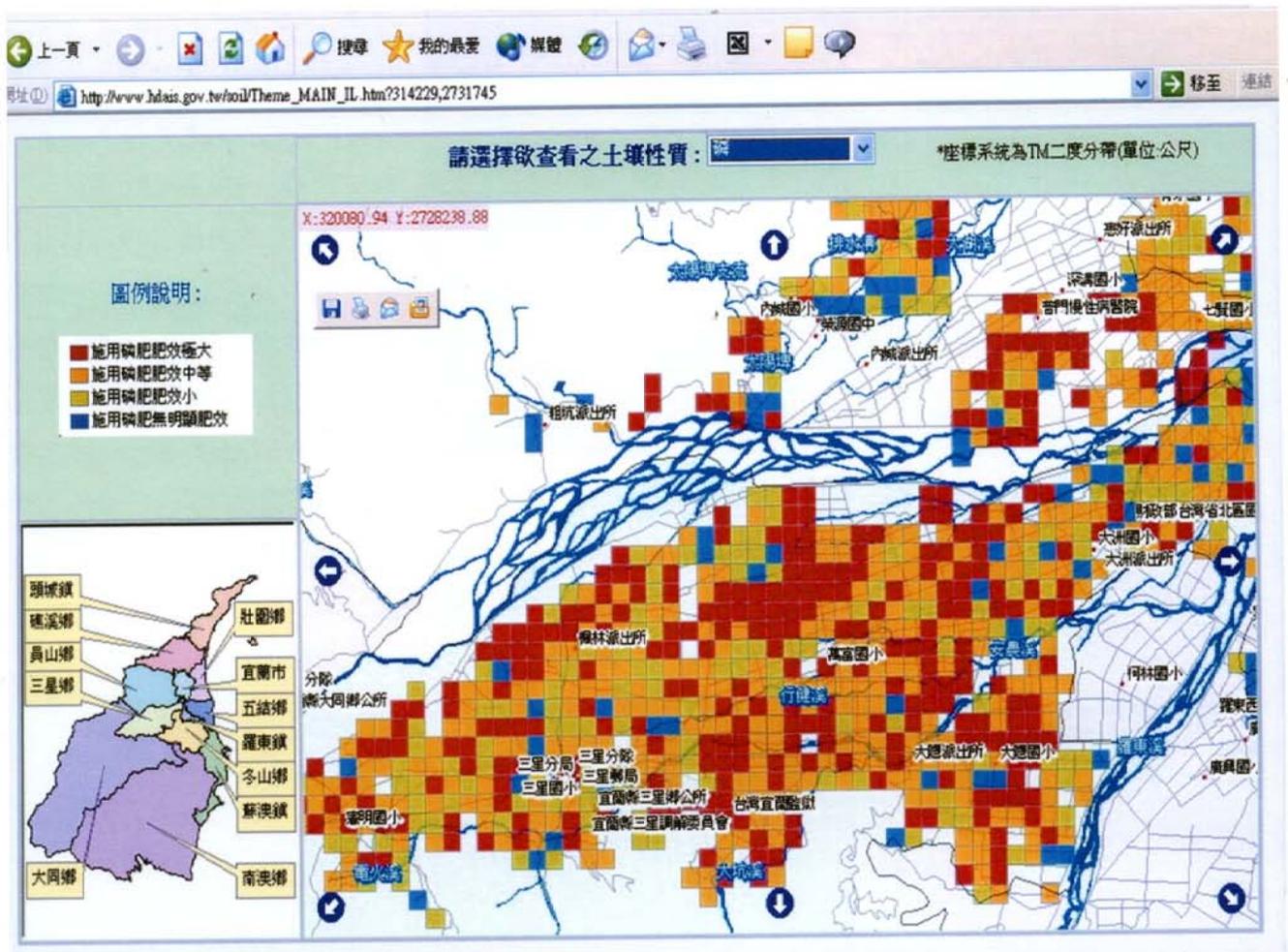
Due to the natural constraints, e.g., the topography and mother materials of soil, Hualien and Yilan Counties have severe soil problems such as extreme acidity, base, microelements deficiency, and poor drainage. Therefore, our priorities in soil and fertilizer research include the exploitation of the causes and solutions of plant nutrition disorders, the recommendation of reasonable fertilization through the diagnosis of soil and plant tissues, and the improvement of cultural techniques, compost making and cultural medium formulation for organic and protective cultures.

In the past few years, soil and crop scientists of this Station have established the complete soil database covering Hualien and Yilan Counties by the method of grid survey. The obtained information has been utilized in farmers' educational program of "Soil characteristics and appropriate fertilization" held in every township in this district. In order to enhance our service quality, this Station has also made the soil database available to the public. Farmers and agricultural industries and scholars can easily access to the soil information by linking to our website.

We also developed the "pseudo-composted rice hull medium" from agricultural wastes for the cultivation of melons, vegetables and fruit trees. This medium can be reused and possesses the advantages of low cost, low salt content and good ventilation. A compost containing chicken manure, rice bran and rice hull has been formulated which possesses the potential of increasing the yield of cucumber by 20-30%. As the fertility of this compost can last for up to six months, the operation of top-dressing fertilizers is less needed. The quality of flowering Quince (*Chaenomeles sanenness*) can be enhanced significantly if pot-cultured with loam, perlite and peat moss, and covered with organic fertilizer. Foliar fertilization with a solution of potassium chloride and potassium phosphate can improve guava's sweetness. Inoculation of the mixture of mycorrhizal fungi, nitrogen-fixing bacteria and phosphate-solubilizing bacteria to seedless water melon allows better growth and high rate of nutrition utilization of the plants. A six-year organic farming experiment for the evaluation of different rotation systems has been conducted. Compared to the "paddy-upland" pattern, the "upland-upland" pattern performed better in terms of nutrient-supplying capability of the soil and the yield of crops.



辦理講習會，建立農民施肥觀念
Educating farmers the concept of
reasonable fertilization.



土壤資訊網站，提供線上即時查詢
 Website of soil information provides immediate online search.



假堆稻殼可做為設施栽培介質 Pseudo-composted rice hull as a cultivating medium.



無子西瓜接種菌根菌，可促進生長

Inoculating mycorrhiza to promote the growth of seedless water melon.

不同輪作系統進行有機栽培，
「旱田-旱田」輪作栽培產量高
The upland-upland rotation
pattern gives the highest crop
yield among various treatments.



稻殼堆肥可提高小胡瓜產量達
20~30%

Increasing cucumber yield up to
30% by the application of rice
bran compost.

農業機械

農業機械之研製改良係針對農作栽培環境之改善，開發相關農機使具備有省時省工提升作業效率之功能，並經由機械化、自動化方式，促進產業升級為目標；目前發展方向為施肥機械、田間園藝機械及農產品加工利用機械。

施肥機械方面，開發有機質肥料撒佈機、綜合型肥料撒佈機、花改-III型施肥機，合計推廣641台，每年撒佈作業面積達3萬公頃以上，節省作業費用六仟萬元。其中綜合型肥料撒佈機結構取得新型專利，可配合化學肥料及有機質肥料之撒施，每公頃撒施作業時間僅45分鐘。為促進施肥機械功能之提升，研製完成施肥作畦一貫作業機，完成整地、施肥、作畦，達到一貫作業，每公頃作業時間2~4小時，節省作業成本6,000~8,000元。

在田間園藝機械方面，開發蔬菜種子田間直播機具，包括有簡易手推式及自走式承載型直播機，其中直播機田間播種可節省種子28~86%，且播種均勻發芽一致，提升工作效率，降低生產成本；半自動移植機一次可種植二行，並可配合三段式株距之調整。蔬菜種子播種一貫作業器及承載型直播機以及可調式承載機具，分別取得一項發明專利及二項新型專利。

農產品加工利用機械方面，開發完成兩種文旦分級機包括：I型分級機係利用滾軸原理，並與重量式分級機之結合，可分級文旦大小。II型分機級係利用可調式滾軸高度分級裝置，可明顯提升分級效率。



曳引機承載綜合型肥料撒佈機
Dragging machine bearing fertilizer spreader for granular or powdery fertilizers.



承載型蔬菜種子直播機田間作業情形
Operation of a loading-type seeder for vegetable planting.

Agricultural Machinery

Mechanized and automated operation in agricultural production can increase the working efficiency by saving labor and time, and therefore considered essential to the upgrade of modern agricultural industry. Scientists of this Station are devoted to the development of machines for fertilization, cultivation of horticultural crops, and processing of agricultural products.

This Station has developed various types of fertilization machines used on organic and/or chemical fertilizers of different shape and particle size. Currently, a total of 641 machines are used for fertilization in over 30,000 hectares of farmland, which saves at least NT\$60 million dollars in operation each year. One of the machines, the fertilizer spreader for granular and powdery organic fertilizers has been granted patent for its new design. It needs only 45 minutes to fertilize one hectare of land. A multi-functional machine capable of plowing, making ridges and applying fertilizers simultaneously has also been developed. The operation efficiency is 2-3 hours per hectare which can save NT\$6,000-8,000 dollars as compared to conventional machines.

For the cultivation of horticultural crops, the simple hand-pulling and powered automatic loading seeders have been developed for the seeding of small-seed leafy



滾軸式文旦分級機 Roller sorting machine of Wentan pomelo.

vegetables. These machines can save 28-86% of seeds needed and give even germination and uniform stands in the field. They can also significantly increase the working efficiency and lower the production cost. The semi-automatic transplanter can transplant two rows of seedlings at one time. It also allows the choice from three options of the most suitable between-plant spacing. These machines have been granted three patents for their inventive design and new model.

In agricultural products processing, two types of sorting machines for Wentan pomelo have been developed. The type I machine, composed of rollers and a weight classifying design, sorts the fruits by weight. The sorting device of type II machine contains a roller system adjustable for height which can greatly increase the sorting efficiency.



作畦施肥一貫作業機 Synchronous fertilizer-applying and ridge-making machine