The Development History and Future Challenges of Agricultural Meteorology in Taiwan

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ABSTRACT

In accordance with the evolution of the professional personnels resource and the organization, the agrometeorological history in Taiwan can be divided into three development phases since the Central Government has been evacuated from the Mainland in 1949.

The 1st Phase (1949-1985): For lacking of professional personnels and facilities, the agricultural authorities, could not conduct researches and experiments systematically.

The 2nd Phase (1985-1992): The establishment of Agrometeorological Observation Network and the fully funding support from the Council of Agriculture to all the agro-meteorological experiments successfully promoted the local agricultural experiment stations to conduct systematic experiments by well trained professional personnels.

The 3rd Phase (1992 on going): The "Chinese Society of Agrometeorology" has been organized to integrate the efforts of the government and the academic sectors for the future development of agrometeorology in Taiwan.

In addition, this paper also describes the future challenges to be confronted by the agricultural sectors, and proposes recommendations to stimulate future developments of agrometeorology in Taiwan.

FOREWORD

Taiwan is located in the subtropical zone with a complicated topography. Because of the company of the Taiwan landscape and the influence of monsoon, the weather condition in Taiwan vary greatly between areas. In addition, frequent occurrence of disastrous weather events, such as Typhoon, Mei-Yu, and drought has caused tremendous loss in agriculture. The agricultural meteorology therefore has become a focal within the Weather and the Agricultural authorities. As a result, the R & D of utilization on agricultural meteorological information has become one of the most important factors in influencing Taiwan's agricultural policy. This paper will present a brief history of development of the agricultural meteorology in Taiwan.

THE DEVELOPMENT HISTORY OF AGRICULTURAL METEOROLOGY IN TAIWAN

The development of agricultural meteorology in Taiwan can be divided into three phases which are described below:

(1) The First Phase (1949 to 1985):

The Central Government of China evacuated from the Mainland to Taiwan in 1949. In the beginning of the first phase most agricultural hardware constructions were either on halt or outdated, such as the hydraulics facilities and the agricultural mechanics. Since agricultural production were greatly affected by the weather factors, and the crops were mostly damaged by disastrous weather (especially, the typhoons, the frosts, and the droughts). The Weather Bureau of Taiwan Provincial Government, (the former body of the Central Weather Bureau [CWB]) was therefore established in 1949. The Agrometeorology Section of the Observation Division (former office of the present Observation Management Division of the CWB) of the Bureau were responsible for the statistics and conducting research on all agriculturally related climatic information. In those days, most local agricultural meteorology affairs were handled by the Bureau, which issued the Agricultural Meteorological Forecasting weekly and published the Agrometeorology Bulletin.

During the middle of the first phase, JCCC (Joint Commission of Country Construction, the former office of the present Council of Agriculture [COA]) played an important role in promoting agricultural meteorology. In 1976, JCCC designated a specialist within the Forest Department to assist the Weather Bureau, and to promote through coordination the research of agricultural meteorology. From 1976 to 1978, JCCC subsidized the CWB to implement the Study of Agriculture Climate Division in Taiwan. Since 1981, JCCC annually allocated funds to support the CWB to conduct the micrometeorological experiments at the Chiayi Weather Station.

By then, the Department of Agriculture and Forestry of Taiwan Provincial Government (DOAFTPG) conducted an islandwide survey on paddy rice yield at every Agricultural Improvement Stations (AIS). During this phase, except a handful persons in the CWB, who are responsible for the publication of agrometeorology bulletin and issued the agricultural weather forecast, there was no agrometeorologist assigned in any agricultural authorities. Therefore, it was unable to proceed the experiments and researchs on agricultural meteorology in a systematic and an organized manner.

(2) The Second Phase (1985 to 1992)

Because good results were generated from the micrometeorological experiments implemented by the Chiayi Weather Station of the CWB, the CWB and the COA jointly sponsored an "Agricultural Meteorological Operation Seminar" at the Chiayi Weather Station on July 16, 1985. There were a good number of executive officials from all local agricultural competent authorities attended the seminar.

During this seminar, three resolutions had been achieved on the future development of

agricultural meteorology in Taiwan. They were: (a) The collection and utilization of the information of agricultural meteorology are important tasks for the planning of agricultural resources. And the development of agricultural meteorological information should be handled by the COA, and COA should be responsible for further promotion, (b) The CWB should assist the DOAFTPG in the planning and establishment of "Agrometeorological Observation Network in Taiwan"; and (c) The trainning of agriculture meteorological personnel should be strengthened.

Based upon the above stated resolutions, the COA was responsible for furnishing the funds, whilst the CWB was assisting on the planning. From January 1986 to June 1991, a total number of 13 agrometeorological stations on first class and 12 on second class were established islandwide at each AIS. The first class agrometeorological stations were equipped with computer aided observation equipments, and the second class stations were equipped with conventional meteorological observation instruments with analogical recording system.

During the gradual establishment of Agrometeorological Observation Network, the CWB and the DOAFTPG had jointly held several seminars, attended by designated personnels from each AIS,to learn the basic theories and practical affairs of agriculture meteorology. From 1989, the COA prepared an annual budget to support each AIS on their observation of agricultural meteorology, and on their experiments related to agrometeorology.

Within the Advisory Committee of Agricultural Experiment and Research (ACAER) of DOAF, an Agricultural Meteorology Section was established, which was responsible for evaluating the agrometeorological projects proposed by each agricultural authority.

In July 1991, the ACAER of DOAF and other relevant weather authorities held a meeting to ascertain the future R & D direction on local agrometeorology, the following four points were regarded as the main objectives:

[1] Agro-biometeorology
[2] Application for Farming Under Structure Micrometeorology
[3] Research on Agriculturally Disastrous Weather
[4] Planning and Utilization of Agrometeorological Resources

Since the research of agrometeorology has gradually become a focal point, the Agricultural Machinery Department of the Taiwan Agricultural Research Institute has been renamed to Agricultural Engineering Department and a new Agrometeorological Research Office has also been established in 1991. Whereas each AIS has established the Agrometeorological Research Office, assigned with special personnel responsible for the R & D, based on the "DOFA's Adjustment Projects of Agricultural Experiment and Improvement Stations."

From 1989 to 1991, DOAF invited several senior Japanese agrometeorological scholars as consultants to conduct short-term teaching and trainning courses, and to give recommendation on future development. Meanwhile, all agrometeorological local agricultural research institutes were maintained by professional personnel on agricultural meteorology, and had specific

development targets.

(3) The Third Phase (1992 on going)

The number of experts and scholars of agrometeorology in all agricultural and weather authorities were gradually increased through the participation of seminars and experiments in the second phase. In February 1992, some enthusiastic personnel have initiated the organization of "Chinese Society of Agrometeorology (CSOA)" with the purpose to promote the communication and coordination among agrometeorologists in consolidate the manpower of academic and governmental operation authorities. The CSOA was finally incorporated in September 23, 1992, with a number of 240 members. The first Chairman was assumed by Dr. TU, Chin-chyu, Director General of the Taiwan Agricultural Research Institute.

The meetings of Board of Directors and Supervisors of CSOA will be held periodically to discuss the relevant academic and research activities. Every three months, a periodical newsletter will be published, to report the current affairs and activities. Seminars of agricultural meteorology will be held more frequently. From then on, the R & D of Taiwan agrometeorology would not be led by the government alone, but mutually promoted by a group of academic scholars and experts in government authorities.

THE CHALLENGES CONFRONTED BY FUTURE AGROMETEOROLOGICAL DEVELOPMENT IN TAIWAN

Due to the constraints of insufficiency of professional manpower and hardware facilities, the development of agrometeorology in Taiwan has not had a specific development direction and an organization in sound state, until the 1990s.

Still, there are a number of challenges and unfavorable factors to be confronted and overcome in the future. The specific disastrous weather events in Taiwan, and the impacts on agricultural products soon after joinning GATT, as well as the daily worsen industrial pollution to the farmland are all important issues to be seriously studied.

In addition to the basic research of agricultural meteorology, which provides the agricultural competent authority with the needed information to stipulate agricultural production plan and improve production technology, the future agrometeorological development should also include practical goals of problem solving. These may include: the establishment of disastrous weather prior warning system; the R & D of crop model for major crops and cash crops; the application of cultivation under cover micrometeorology, the research of reduction of harmful pollution to agriculture sector. In order to achieve the above stated objectives, the CSOA should recruited scientists from all fields, such as meteorology (synoptic meteorology and micrometeorology), plant breeding, pest management, bio-meteorological statistics, and environmental engineering. The CSOA should also enhance the international exchanges keep up with current science and technology that are related to agricultural meteorology and to continuously upgrade local research capabilities on agrometeorology.