MEXICAN AGRICULTURAL WEATHER MONITORING FROM USDA'S PERSPECTIVE

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1. INTRODUCTION

Mexican agricultural weather monitoring by the U.S. Department of Agriculture is the product of more than a century of evolution. Agricultural weather reporting began in November 1872, when the U.S. War Department initiated the publication of the *Weekly Weather Chronicle*. The publication's name was changed to the *Weather Crop Bulletin* in May 1887 to reflect its agricultural content. In July 1891, the *Weather Crop Bulletin* was transferred to the fledgling U.S. Department of Agriculture (USDA).

Global agricultural weather monitoring gained momentum in January 1922, when the *Weather Crop Bulletin* was merged with another USDA publication and renamed *Weather, Crops and Markets* (fig. 1). Although the publication underwent a final name change in January 1924, to the *Weekly Weather and Crop Bulletin*, agricultural content remained an important component. An expanded international section was gradually introduced into the *Weekly Weather and Crop Bulletin* during the 1970's.

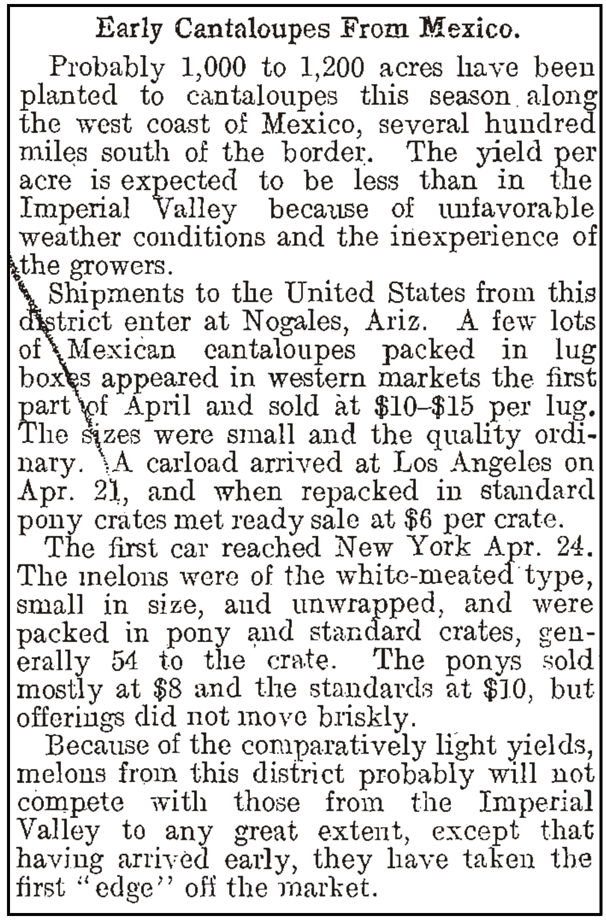
Currently, nearly a dozen meteorologists from the U.S. Departments of Agriculture and Commerce carefully monitor real-time agricultural weather developments in Mexico and elsewhere around the globe. With economic globalization, agricultural weather developments are increasingly important to the supply-and-demand aspect of the world's food supply.

2. JOINT AGRICULTURAL WEATHER FACILITY

The "modern era" of agricultural weather monitoring began with the creation of the Joint Agricultural Weather Facility (JAWF) in 1978. JAWF is a global agricultural weather and information center located at USDA Headquarters in Washington, D.C. As the name suggests, JAWF is jointly operated by the Department of Commerce's Climate Prediction Center of the National Weather Service (DOC/NWS/CPC) and USDA's World Agricultural Outlook Board and the National Agricultural Statistics Service (USDA/WAOB and USDA/NASS).

2.1. *JAWF PRODUCTS*

Today, the *Weekly Weather and Crop Bulletin (WWCB)*, remains an important outlet for conveying JAWF's global agricultural weather intelligence. The current *WWCB* is available in Portable Document Format



Early Cantaloupes From Mexico.

Probably 1,000 to 1,200 acres have been planted to cantaloupes this season along the west coast of Mexico, several hundred miles south of the border. The yield per acre is expected to be less than in the Imperial Valley because of unfavorable weather conditions and the inexperience of the growers.

Shipments to the United States from this district enter at Nogales, Ariz. A few lots of Mexican cantaloupes packed in lug boxes appeared in western markets the first part of April and sold at $10–$15 per lug. The sizes were small and the quality ordinary. A carload arrived at Los Angeles on Apr. 21, and when repacked in standard pony crates met ready sale at $6 per crate.

The first car reached New York Apr. 24. The melons were of the white-meated type, small in size, and unwrapped, and were packed in pony and standard crates, generally 54 to the crate. The ponys sold mostly at $8 and the standards at $10, but offerings did not move briskly.

Because of the comparatively light yields, melons from this district probably will not compete with those from the Imperial Valley to any great extent, except that having arrived early, they have taken the first "edge" off the market.

Fig. 1. Excerpt from *Weather, Crops, and Markets*, May 6, 1922, page 389.

(PDF) from USDA via the Internet, and PDF archived copies from 1971-2006 can be downloaded from Cornell University's Albert R. Mann Library (fig. 2).

Important climate and crop information on the world's key agricultural regions is conveyed through another JAWF publication, *Major World Crop Areas and Climatic Profiles*. Although the *Profiles* book was last updated in print in September 1994 (fig. 3), regular revisions of domestic and international crop areas and production figures are provided on-line.

3. MEXICAN CROP AREAS AND RAINFALL DATA

For many years, JAWF meteorologists were limited to World Meteorological Organization (WMO) data streams for receiving Mexican rainfall data. WMO data is

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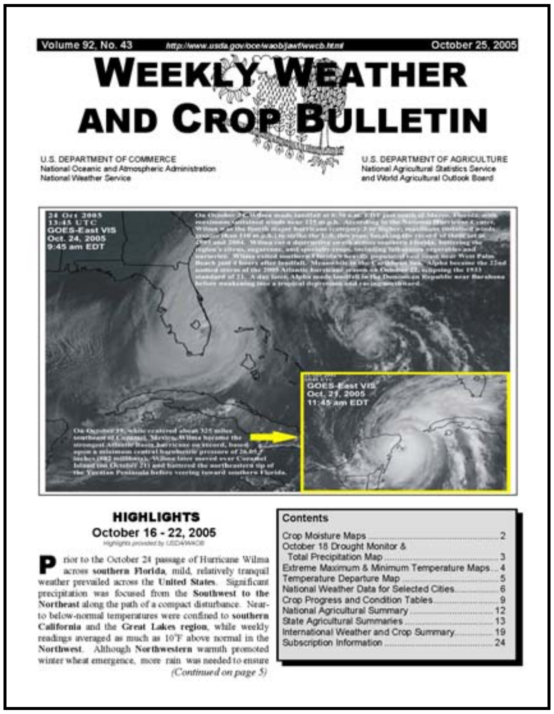

Fig. 2. Sample archived front cover of the *Weekly Weather and Crop Bulletin*, October 25, 2005, from Cornell's Mann Library.

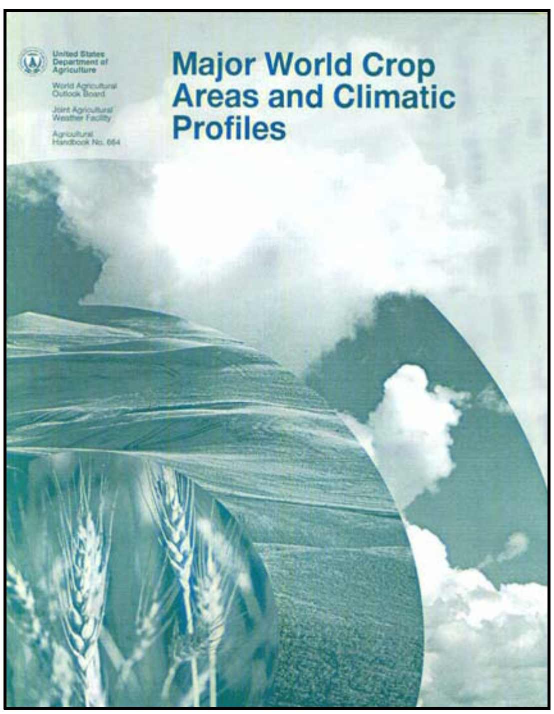

Fig. 3. Cover image of *Major World Crop Areas and Climatic Profiles*, revised September 1994.

particularly sparse in Mexico's rural and agricultural regions. Some heavily agricultural Mexican states, such as Jalisco and Guanajuato, are supported by only one or two WMO weather stations (fig. 4).

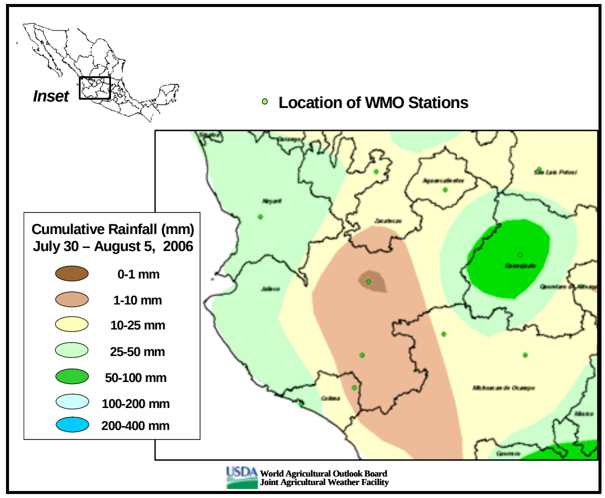

Fig. 4. Cumulative rainfall (mm) in west-central Mexico, July 30 - August 5, 2006, based on WMO data. WMO station locations are represented by green dots.

3.1. *ENHANCED MEXICAN RAINFALL DATA SET*

However, through an agreement with the Mexican weather service (Servicio Meteorológico Nacional, or SMN), JAWF analysts have access to far more detailed Mexican rainfall data than by standard World Meteorological Organization (WMO) channels (fig. 5). In addition, JAWF scientists take advantage of recent advances in Geographic Information Systems (GIS) technology. The enhanced Mexican rainfall data set is overlaid on state- or district-level crop production data, yielding a far more detailed agricultural weather analysis than previously possible (fig. 6).

4. MEXICAN RESERVOIR DATA

Since irrigation is crucial for crops produced in arid and desert locations of northern Mexico, JAWF also monitors Mexican reservoir information posted publicly on the Internet by Servicio de Información Estadística Agroalimentario y Pesquera (SIAP). As of September 20, 2006, nearly half of Mexico's water utilized for irrigation was stored in northwestern Mexico, with much of the remainder in north-central, central, and northeastern sections of the country.

Figure 7 shows water volume as a percent of capacity in northwestern Mexico from 2001 to 2006. Irrigation reserves dropped precipitously at the height of a major drought from 2002 to 2004, but recovered during the phenomenally wet winter of 2004-05. Reserves diminished somewhat during the dry winter of 2005-06, but were again replenished during the exceptionally wet

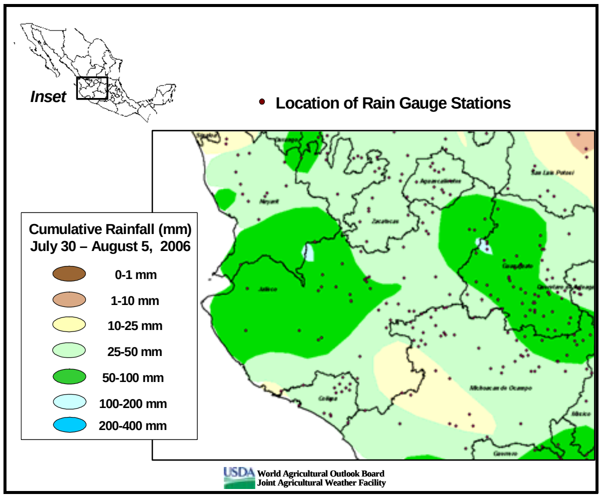

Fig. 5. Cumulative rainfall (mm) in west-central Mexico, July 30 - August 5, 2006, based on rain gauge data provided by SMN. Mexican station locations are represented by small black dots.

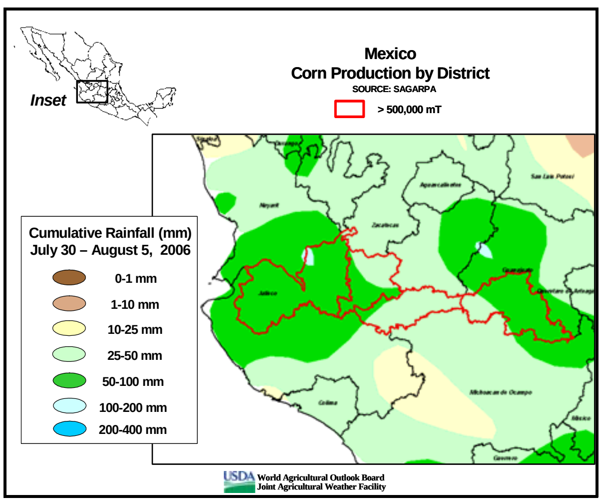

Fig. 6. GIS overlay of Mexican rain gauge analysis for July 30 - August 5, 2006, and areas with significant corn production. Boundaries of districts with average annual corn production in excess of 500,000 metric tons are highlighted in red.

2006 summer rainy season. Summer is typically the key period for Mexican reservoir recharge, but global phenomena such as El Niño and La Niña can play a key role in governing northern Mexico's winter weather patterns.

Finally, water-supply monitoring is useful in hydrologic basins shared by the United States and Mexico. Prominent shared basins include the Colorado River and the Rio Bravo/Rio Grande (fig. 8). A protracted period of drought, like the one recently observed in northern Mexico, can sharply reduce irrigation reserves and strain relations between otherwise friendly nations.

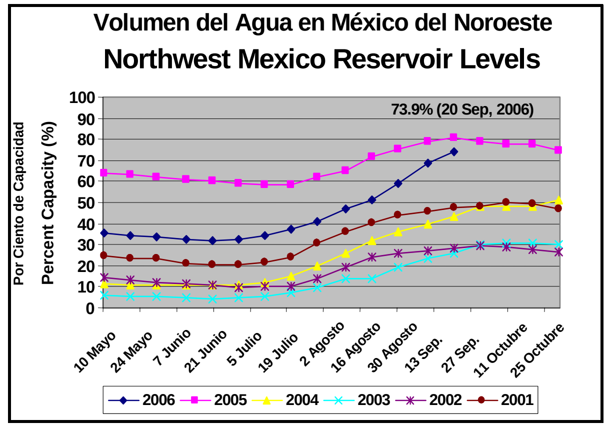

Fig. 7. Mexican reservoir storage, 2001 to 2006, as a percent of capacity. Source: SIAP.

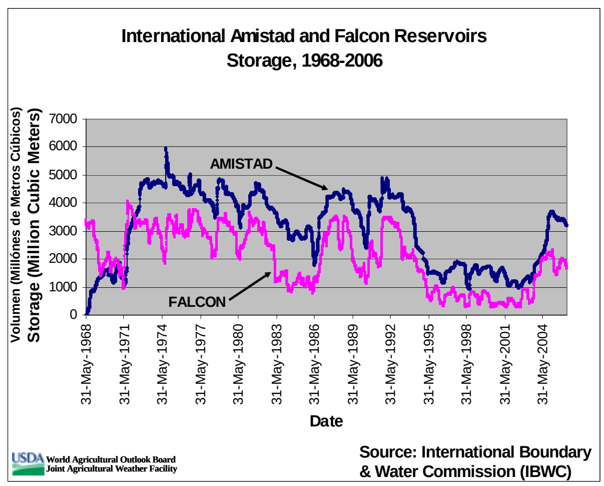

Fig. 8. Storage in the international Amistad and Falcon Reservoirs, 1968 to 2006.

5. CONCLUSION

The United States has monitored Mexican agricultural weather for many decades. However, the creation of the Joint Agricultural Weather Facility (JAWF) more than a quarter century ago brought global agricultural weather surveillance to the forefront of operations.

Even in today's complex global economy, agricultural supply and demand for Mexico and other nations is often driven by weather extremes. JAWF's agricultural weather monitoring for Mexico is significantly enhanced by cooperation between the governments of Mexico and the United States. Cooperation is particularly important with respect to data-sparse rural, agricultural regions and in areas near the U.S.-Mexican border, where a shared water supply (e.g. Rio Bravo/Rio Grande) is utilized for irrigation and other uses.

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