

The stands of cane, cotton, corn, and rice are generally good in all districts. Cotton is practically all in, and the acreage of this staple will vary but slightly from that of 1893. There is an increased acreage to cane, and to rice in portions of the southwestern parishes.

**Missouri.**—From the 22d to the 29th vegetation made considerable growth, but there was a lack of moisture until the 29th and 30th when local showers occurred in all sections, though in many of the northern and western counties droughty conditions prevailed until the close of the month.

**New England.**—Rain is badly needed in most sections for the growth of vegetation; springs and wells are very low, some observers reporting that they are the lowest ever known at this season of the year.

**Nevada.**—Precipitation was generally deficient throughout the State. Until the storm of the 21st and 22d the ranchers were fearful as to the crops, not enough snow having fallen in the mountains to give a sufficient supply of

water for irrigation; but as the snow fell to considerable depth all over the mountains it is expected that the water supply will be all that is required.

**North Dakota.**—This month has been remarkable only for the unusual amount of precipitation. This excess and the continued cold and cloudy weather delayed farm work in all parts of the State, so that the season was considerably behind the average for the past few years, but with the average amount of sunshine that is to be expected, it is probable that the time lost during this month will be made up later.

**Oklahoma.**—In every section of the country the rainfall has been abundant, the weather warm and pleasant, and crops of all kinds in good condition.

**Tennessee.**—Nunnally; want of rain has caused all seed planted early in the month to germinate badly.

**Utah.**—Blustering high winds were frequent throughout the month; they were dry and had a bad effect on crops.

WIND.

PREVAILING WINDS.

The prevailing winds for April, 1894, viz, those that were recorded most frequently at Weather Bureau stations, are shown in Table I, but are not given on Chart II, as has hitherto been the custom. The summary of State Weather Service reports gives the prevailing winds recorded at voluntary stations in the respective States; these may be summarized as follows:

**South.**—Alabama, Arkansas, Connecticut, Louisiana, Oklahoma, Tennessee, Texas.

**Southwest.**—Arizona, Indiana, Kentucky, Massachusetts, Michigan, Nevada, Ohio, Oregon, South Carolina, Washington.

**West.**—California, Colorado, Georgia, New Mexico, West Virginia.

**Northwest.**—California, Georgia, Idaho, Maryland, Montana, Nebraska, New Jersey, New York, Pennsylvania, South Dakota, Utah, Virginia, Wyoming.

**North.**—New Hampshire, Vermont.

**Northeast.**—Maine.

**East.**—None.

**Southeast.**—Florida, Illinois, Iowa, Minnesota, Missouri, North Carolina, North Dakota, Wisconsin.

RESULTANT WINDS.

The resultants for the current month, as deduced from the hourly records of winds, by self-registers at about 67 regular Weather Bureau stations, are given in Table VIII. Other resultants, deduced from the personal observations made at 8 a. m. and 8 p. m. at all stations that appear on the morning and evening maps of the Weather Bureau, are given in Table IX. These latter resultants are also shown graphically on Chart II, in connection with the isobars based on the same system of simultaneous observation; the small figure attached to each arrow shows the number of hours that this resultant prevailed, on the assumption that each of the morning and evening observations represent one hour's duration of a wind of average velocity; these figures (or the ratio between them and the total number of observations in this month) indicate the extent to which winds from different directions counter-balance each other. The original north, south, east, and west components, on which these resultants are based, are given in detail in Table IX for convenience in making further studies.

During April the resultant direction, as shown by Table IX, was from the northwest in New England, the middle Atlantic States, and the south Pacific coast region; from the southwest in the north Pacific coast region; from the south, viz, southeast and southwest, in the eastern and western Gulf regions; from the southeast in the upper Mississippi and Missouri valleys; from the west, viz, southwest and northwest, in the lower Lake region, northern, middle, and southern plateaus, northern and middle Pacific slopes.

In general, the resultant winds and directions fall within

the same quadrant, but occasionally a notable discrepancy occurs, as shown by the large positive or negative angles in the eleventh column of Table VIII; the resultant directions given in Table IX also differ sometimes largely from those given for the same stations in Table VIII. As notable discrepancies of this kind, on the one hand, illustrate the remarks on this subject made in the REVIEWS for last September and January, and, on the other hand, invite a special consideration of local peculiarities, therefore, the following remarks on the resultant winds for the current month are appropriate:

At Norfolk there is an actual prevalence of weak north, northeast, and east winds, which gives a resultant direction n. 51° e. computed from the duration. The south and southwest winds, however, blow with twice the velocity of the north, northeast, and east winds, thus giving a resultant movement as in Table VIII. It would seem that the wind that blows at Washington and Lynchburg as a northwest wind is felt in Norfolk as a southwest wind.

The discrepancy between Cleveland and Toledo appears to result from the fact that the east winds at Toledo become southeast winds at Cleveland probably through some local cause at one station or the other. The south and southwest winds at Toledo have a much greater velocity than at Cleveland.

At Marquette the north winds were extremely light, whereas the south and southeast winds were strong, although they did not blow for so long a period.

HIGH WINDS.

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Weather Bureau as follows (maximum velocities are averages for 5 minutes; extreme velocities are gusts of shorter duration):

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Amarillo, Tex	8	64	n.	Fort Canby, Wash	1	64	s.
Do	16	58	s.	Do	6	66	s.
Do	17	60	sw.	Do	17	56	s.
Do	26	58	se.	Do	28	64	s.
Do	28	52	s.	Huron, S. Dak	3	64	nw.
Bismarck, N. Dak	3	50	nw.	Lexington, Ky	10	62	sw.
Block Island, R. I	11	72	e.	Do	18	60	ne.
Do	12	59	e.	Nantucket, Mass	11	60	ne.
Do	13	60	ne.	Pikes Peak, Colo	2	82	w.
Cheyenne, Wyo	2	50	nw.	Do	3	54	w.
Chicago, Ill	3	50	se.	Do	29	104	sw.
Do	30	52	sw.	Port Huron, Mich	4	54	sw.
Colorado Springs, Colo	12	50	n.	Pueblo, Colo	30	50	n.
Do	30	52	n.	Tatoosh Island, Wash	25	53	e.
Columbus, Ohio	4	52	w.	Valentine, Nebr	19	52	nw.
El Paso, Tex	17	50	nw.	Winnemucca, Nev	25	52	w.
Erie, Pa	10	60	se.	Woods Holl, Mass	4	54	sw.

LOCAL STORMS.

**1st.**—At Salubria, Idaho, a heavy windstorm began at 11

p. m., and continued until 2.50 a. m., 2d; damage was done to fences.

**3d.**—During a heavy thunderstorm at Madding, Ark., damage was done by wind.

**4th.**—Thirteen miles south of Orlando, Fla., a heavy wind and hail storm destroyed crops. Considerable damage was done by a windstorm at Sutton, Nebr.

**5th.**—Northeast gales and heavy snow prevailed over the New England States, and heavy seas were reported along the coast. At Boston, Mass., moist snow began at 12.05 a. m., accompanied by high wind; much damage was done to electric wires. A schooner went ashore at Hull, Mass.; the vessel was a total wreck, but the crew were saved by the Life-Saving Service. At Chatham, Mass., a barkentine was wrecked and six men were drowned. A severe local storm moved northeast over Siloam Springs, Ark., about 11 p. m., attended by high wind and small hail; one person was killed and a house demolished. At Lehigh, Ind. T., a severe wind and rain storm, accompanied by large hail, did considerable damage to gardens. The storm was general throughout Indian and Oklahoma Territories; electric wires were prostrated and houses damaged. An exceptionally severe windstorm, attended by heavy rain and hail, passed over Coffee County, Kans., about 6 p. m.; within a radius of 4 miles 17 houses were demolished or damaged beyond repair, orchards were ruined and stock killed; the damage to property and crops was estimated at \$100,000. At Sedan, Kans., a storm moving east injured several persons and destroyed houses and orchards. In the eastern part of Greenwood County, Kans., several houses were demolished and great damage was done to crops.

**9th.**—A storm of wind and rain, moving in a path about 2 miles wide, visited the vicinity of Clarksdale, Miss., about 3.30 p. m.; the damage to property was estimated at about \$4,000. A severe thunder and wind storm occurred at Lonoke, Ark., about 1.30 p. m.; several persons were injured and property was damaged to the extent of \$8,000. A heavy rain and thunder storm passed over the vicinity of Pocahontas, Ark., washing away bridges. During a thunderstorm at Louisville, Ky., some damage was done by lightning. Damage was caused by lightning in Warrick and Spencer counties, Ind.

**10th.**—A report from Bladen County, N. C., states that a severe wind-storm passed over the vicinity of Prospect Hall, in that county, in the evening. Considerable damage was done to property. A storm, moving northeast, struck Newberry County, S. C., about 12.30 p. m.; a roar was heard on either side of the track for a distance of 2 or 3 miles. It did slight damage for a distance of 6 miles, then the cloud appeared to descend, and in a space of half a mile almost every tree was torn up by the roots. Houses were blown down by a heavy windstorm at Tatum Station, S. C.

**10-12th.**—Unusually severe snowstorms, accompanied by gales, prevailed over New England and the middle Atlantic States, causing loss of life and damage to shipping. At Boston, Mass., alternate rain and snow with hard gales prevailed from the morning of the 11th to the 13th; all vessels remained in port. Along the Massachusetts coast several vessels were blown ashore. At Vineyard Haven, Mass., a heavy rain and gale began at 3 p. m., 11th, changed to snow at 7 p. m., and continued until the morning of the 12th. A number of accidents occurred to shipping, and electric wires were prostrated. A severe snowstorm, with a northeast gale, began at New Haven, Conn., the early morning of the 11th and continued until 11.10 a. m., 12th; damage was done to electric wires and traffic delayed. At Bridgeport, Conn., a heavy snowstorm began at 3.40 a. m., 11th, and continued until 11 a. m., 12th; damage was done to electric wires. A report from New York, N. Y., states that at Highland Beach, N. J., 2 vessels were lost and 15 persons drowned. The sea was very heavy

all along the New York and New Jersey coasts, and much damage was done to property.

At Buffalo, N. Y., a snowstorm began at 9.50 a. m., 10th, and continued until 2.45 p. m., 11th; 8.9 inches of snow fell during the storm. Traffic was delayed and damage was done to electric wires and trees. A heavy snowstorm, with high northeast wind, began at Toms River, N. J., on the 10th, and continued until the early a. m. of the 11th; outhouses and trees were blown down. A severe storm of wind and rain began at Erie, Pa., at 8.35 a. m., and continued until 11.18 p. m., 10th. The wind reached a maximum velocity of 60 miles per hour; one person was injured, great damage done to electric wires, and railroad traffic delayed. At Harrisburg, Pa., snow began 9.24 a. m., 10th, and continued at intervals until early a. m., 12th. About 18 inches of snow fell, damaging trees and electric wires. A tabulated statement, giving the beginning and ending, and the total depth of snowfall in the several States during this storm, is given on page 164.

**11th.**—A cloudburst occurred 18 miles northwest of Boerne, Tex., about 5 p. m.; railroad tracks were washed out and crops destroyed.

**13th.**—About 5.30 p. m., a violent local storm, with hail and a funnel-shaped cloud, passed 3 miles east of Bowie, Tex., in a path about 300 yards wide, injuring several persons and damaging property to the estimated value of \$2,500.

**14th.**—Crops were destroyed by hail at Canton, Miss.

**15th.**—High wind in the early morning, damaging fences and trees, at Florence Station, Tenn.

**17th.**—During a thunderstorm at Mason, Tenn., one person was killed by lightning. Minor damage was caused by a thunderstorm at Palestine, Tex., from 9.35 to 11.05 a. m. A narrow belt of storms swept across the State of Iowa from Harrison to Clinton counties; in the former county the rain was very heavy, causing damage by flood. At Mitchellville, Iowa, the hail did considerable damage to glass. At Albia, Iowa, a house was struck by lightning. A thunderstorm, lasting about one hour, began at Davenport, Iowa, at 5.15 p. m.; for fifteen minutes the wind blew at the rate of 48 miles per hour; considerable damage was done to buildings. During a thunderstorm near Keosauqua, Iowa, one person was killed and another stunned by lightning. High wind at St. Charles, Mo., blew down fences. In the evening rain and hail storms prevailed in central and southern Kansas and the Cherokee Strip, Okla., damaging property and crops.

**18th.**—Severe local storms occurred in Arkansas, Illinois, Indiana, and Missouri. A heavy wind, rain, and hail storm moved southeast over Lonoke and Prairie counties, Ark., injuring several persons and damaging buildings and timber. A windstorm, moving northeast, occurred at Maysville, Ky., about 4 p. m.; a funnel-shaped cloud was observed; one building was wrecked. During a thunderstorm at Bloomington, Ill., a barn was struck by lightning. About 6.20 p. m. a severe storm with a funnel-shaped cloud caused damage to the amount of \$8,000 at New Athens, Ill. At Springfield, Ill., a heavy thunderstorm, moving northeast with high wind and hail, prevailed from 11.25 a. m. to 1.20 p. m. The temperature fell 18° in thirteen minutes; a horse was killed by lightning, and damage was done to property. In Carroll County, Ind., a thunderstorm with high wind caused considerable damage of a minor character. At Cedar Gap, Mo., a thunderstorm caused damage to the amount of \$200. During a thunderstorm at Gordonville, Mo., 2 persons were injured by lightning. A severe storm, about 20 miles northeast of Potosi, Mo., caused damage of a minor character. A severe storm with a funnel-shaped cloud moved northeast over Summersville, Mo., about 4 p. m.; the storm had a whirling motion from right to left; 3 persons were killed, a number injured, and 8 houses were blown down.

**19th.**—A barn was struck by lightning and stock killed during a thunderstorm at Cumberland, Wis.

**20th.**—A rain, hail, and thunder storm occurred at Clayton, N. Y., about 7.15 p. m., causing considerable damage to property. Eight miles north of Augusta, Ga., a hailstorm of short duration damaged young corn.

**21st.**—During a thunderstorm at North Hammond, N. Y., considerable damage was done by lightning. At Binola, Ohio, a barn was struck by lightning.

**23d.**—A heavy thunder, rain, and hail storm prevailed at Shreveport, La., in the afternoon; crops were damaged. At Burkeville, Tex., a storm, with a funnel-shaped cloud, thunder, and lightning, moved east, damaging property to the amount of \$2,000.

**24th.**—Heavy thunder and hail storms occurred in Louisiana. At Lawrence, La., a wind, rain, and hail storm began at 8.30 p. m., destroying garden truck. At New Orleans, La., a thunderstorm, with exceptionally heavy rain, began at 7.50 and continued until 9.35 p. m.; 2.18 inches of rain fell in 55 minutes; a man was killed by lightning. At Pointe a la Hache, La., a heavy rain and hail storm moved in a path about 1 mile wide at 9 p. m.; crops were destroyed. A thunder and hail storm passed over Shreveport, La., between 5.50 and 7 a. m., during which the wind reached an extreme velocity of 60 miles per hour; hothouses were demolished and crops badly damaged. The storm swept over the adjoining parish of Bossier, ruining corn and cotton. At Williams, in Red River Parish, the storm was reported one of the most destructive that has visited that locality. A heavy thunderstorm at Luling, Tex., destroyed crops.

**25th.**—In the early morning a heavy rain and hail storm at Garden City, Kans., was very destructive to grain. During a strong gust of wind at Seattle, Wash., at 9.55 p. m., the wind vane and anemometer support at the Weather Bureau Office were blown down and broken. A thunderstorm passed 4 miles west of Olympia, Wash., in the evening; 2 barns were struck by lightning.

**27th.**—During a thunderstorm at Chicago, Ill., in the evening, 2 persons were killed by lightning.

**28th.**—In the southern part of Cumberland County, N. J., 3 persons were stunned and several houses were struck by lightning. A severe local storm moved southeast over Mansfield, Ohio, about 5.30 p. m.; the damage to property was placed at \$5,000. Glass was broken by heavy hail at Lansing,

Mich. An unusually heavy rain and thunderstorm occurred at Winnview, Okla.; stock was killed by lightning. Damage was done by a hail and wind storm at Whiteside, Mo. Hailstorms of marked severity prevailed throughout Iowa. At Cherokee, Iowa, the damage by hail was estimated at \$10,000. At Keosauqua, Iowa, 2.43 inches of rain, with heavy hail, fell in about one hour; bridges were washed away and the hail destroyed gardens and glass. At Fayette, Iowa, hail and wind damaged buildings and stock. During a thunderstorm at Nora Springs, Iowa, a boy was killed by lightning. Heavy hail damaged glass at Hartington, Nebr. A windstorm at Beaver City, Nebr., damaged small grain. At Fort Berthold, N. Dak., a heavy wind and thunder storm occurred at night; some damage resulted from the high wind. Considerable damage was done by a heavy windstorm at Wallet, Colo.

**29th.**—At Tyler, Tex., a heavy rain and wind storm, lasting about 40 minutes, did considerable damage to property. At Brunswick, Mo., a windstorm, at 2.40 p. m., caused damage of a minor character. In Calloway County, Mo., some damage was done by high wind. During a thunderstorm about midnight at Steffenville, Mo., stock was killed by lightning. A destructive storm moved northeast in a path about 200 feet wide, near Ellsworth, Iowa; 2 persons were killed. At Forest City and Ottumwa, Iowa, windstorms damaged buildings and trees.

**30th.**—About 4.10 p. m., a severe storm, with a funnel-shaped cloud, moved northeastward in the vicinity of Texarkana, Ark.; 2 persons were killed, and property was destroyed to the estimated value of \$10,000. A heavy wind and rain storm occurred at Bee Branch, Ark., about 9 p. m.; a house was moved from its foundation. Tehuacana, Tex., was visited by a heavy rain and thunder storm, which moved northeast about 2.45 p. m., causing damage to the extent of \$5,000. Destructive thunder and wind storms occurred in Illinois. At Astoria, Ill., the damage to property was \$500. At Rushville, Ill., the storm was attended by thunder, lightning, and hail, doing damage to barns, etc. Three miles east of Bushnell, Ill., considerable damage was done by heavy hail. At Rockford, Ill., rain flooded lowlands and hail damaged fruit. A violent storm, with hail, struck Tower Hill, Ill., about 3.30 p. m.; glass was broken and fruit damaged. During a thunderstorm at Keokuk, Iowa, a house was struck by lightning. Some damage was done by hail at Clinton, Iowa.

## ATMOSPHERIC ELECTRICITY.

### GENERAL STATISTICS.

The table on page 169 shows in detail for April, 1894, the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month.

### THUNDERSTORMS.

A mention of the more severe thunderstorms reported during the month is given under "Local storms." The dates on which reports of thunderstorms were most numerous were the 17th, 196; 18th, 194; 21st, 175; 27th, 164; 28th, 221; 29th, 214; 30th, 155.

The States from which the reports of thunderstorms were most numerous were: Missouri, 197; Ohio, 171; Minnesota, 153; Iowa, 148; Louisiana, 108; Wisconsin, 104.

### AURORAS.

The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four days preceding and following the date of full moon, viz, from the 15th to the 23d, inclusive. On the remaining twenty-one days of the month 175 reports were received, or an average of 8 per day. The dates on which the reported number especially exceeded this average were the 12th (67), 17th (19), 30th (19).

### LIGHTNING.

The voluntary observer, Mr. John J. Cass, of Allison, De-catur Co., Kans., under date of April 2, reports, as follows:

Remarkable electric display here this date. Threatening clouds, followed by a gale and dust storm at 7 p. m. Bluish electric lights on terminal tree buds and on the harness, etc., of teams traveling. Shocks reported from touching fence wires. These conditions existing 10 miles north and south of this station.