RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

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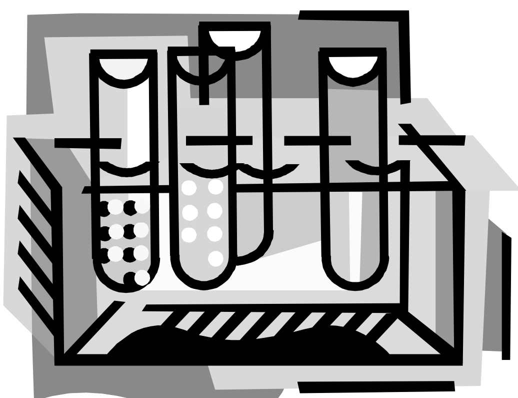

INSIDE

How Rutgers Soil Testing Laboratory Determines Lime Requirement

Joseph R. Heckman, Ph.D., Specialist in Soil Fertility

(Refer to the glossary in the box on page 2 for definitions to unfamiliar terminology.)

When the soil pH indicates that the soil needs to be limed to raise the pH to the desired level for the crop to be grown, the next step is to determine the lime application rate. A soil pH measurement alone does not provide enough information to determine a soil's lime requirement. For example, a sandy loam soil with a pH of 5.0 may need 3600 lbs/acre of CCE to raise the pH to 6.5, while a silt loam soil with a pH of 5.0 may need 8100 lbs/acre of CCE to raise the pH to 6.5 (the same level). This is because soil texture affects the buffering capacity of a soil; that is, finer textured soils have more reserve acidity that must be neutralized to raise soil pH. The reserve acidity tends to contribute to the change in active acidity that is measured as soil pH. The Rutgers Soil Testing Lab previously determined the soil textural class by feel as one of the factors that influences the lime requirement. The lime requirement recommendation was then determined by referring to soil pH and soil texture in look-up tables. Recently this practice has been changed to a more objective, quantitative chemical test for reserve acidity. This new soil test procedure is referred to as the Adams-Evans lime requirement index or buffer pH. Using this method, the lime requirement can be more precisely calculated according to complex equations involving soil pH, buffer pH, and target pH. Look-up tables then can be created for the convenience of users. Table 1 is the look-up table for a target pH of 6.5.

This new way of determining lime requirement improves the accuracy of lime recommendations and the efficiency of the soil test lab. Most other university and commercial soil test labs also determine the lime requirement by measuring the buffer pH and soil pH. However, be aware that not all soil test labs use the same buffer pH method. For example, both Rutgers and the University of Delaware soil test labs use the Adams-Evans buffer method, but the Pennsylvania State University lab uses the SMP buffer method. The Adams-Evans buffer pH method is used by the Rutgers Soil Testing Lab because it is designed for use on Atlantic coastal plain soils. Adams-Evans lime requirement index values usually fall into the range 7.0 - 8.0. A greater value (near 8.0) represents poorly buffered (very sandy) samples while values nearer to 7.0 are

SEE SOIL pH ON PAGE 2

Soil pH from page 1

highly buffered (fine texture or high organic matter). Rutgers soil test reports indicate soil pH and lime requirement index but also provide the calculated lime recommendation to the nearest 100 pounds per acre (for formal reports).

Example

The lime requirement of a soil can be calculated from the Adams-Evans lime requirement index and the water pH (Table 1). For example, a soil with an Adams-Evans lime requirement index of 7.50 and a water pH of 5.4 would require 2.0 tons CCE/acre to increase the pH to 6.5. Look-up tables are also available for other target soil pH levels.

Table 1. Commercial production liming table for crops with a target pH 6.5 for a soil depth of 8”- CCE rate in tons/acre.

Soil	Adams-Evans lime requirement index																			
pH	7.95	7.90	7.85	7.80	7.75	7.70	7.65	7.60	7.55	7.50	7.45	7.40	7.35	7.30	7.25	7.20	7.15	7.10	7.05	7.00
6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
6.3	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0
6.2	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5
6.1	0.0	0.0	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	2.0	2.0
6.0	0.0	0.0	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.5
5.9	0.2	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.5	2.5	2.5
5.8	0.2	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.5	2.5	2.5	2.5	3.0
5.7	0.2	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.5	1.5	1.5	2.0	2.0	2.0	2.5	2.5	2.5	3.0	3.0	3.0
5.6	0.2	0.5	0.5	0.5	1.0	1.0	1.0	1.5	1.5	1.5	2.0	2.0	2.0	2.5	2.5	2.5	3.0	3.0	3.0	3.5
5.5	0.2	0.5	0.5	0.5	1.0	1.0	1.5	1.5	1.5	1.5	2.0	2.0	2.5	2.5	2.5	3.0	3.0	3.0	3.5	3.5
5.4	0.2	0.5	0.5	1.0	1.0	1.0	1.5	1.5	1.5	2.0	2.0	2.5	2.5	2.5	3.0	3.0	3.0	3.5	3.5	4.0
5.3	0.2	0.5	0.5	1.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.5	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.0
5.2	0.2	0.5	0.5	1.0	1.0	1.0	1.5	1.5	2.0	2.0	2.5	2.5	2.5	3.0	3.0	3.5	3.5	3.5	4.0	4.0
5.1	0.2	0.5	0.5	1.0	1.0	1.5	1.5	1.5	2.0	2.0	2.5	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.0	4.5
5.0	0.2	0.5	0.5	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.5	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	4.5
4.9	0.2	0.5	0.5	1.0	1.0	1.5	1.5	2.0	2.0	2.5	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.0	4.5	4.5
4.8	0.2	0.5	0.5	1.0	1.0	1.5	1.5	2.0	2.0	2.5	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0
4.7	0.2	0.5	0.5	1.0	1.0	1.5	1.5	2.0	2.0	2.5	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0
4.6	0.5	0.5	1.0	1.0	1.5	1.5	2.0	2.0	2.5	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0	5.0
4.5	0.5	0.5	1.0	1.0	1.5	1.5	2.0	2.0	2.5	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0	5.0

Glossary for Soil Testing Terminology

Active acidity - Acidity in soil solution which is measured as soil pH.

Adams-Evans buffer method - A method for determining the lime requirement of a soil. It was designed for use with soils that are coarse-textured, with low cation exchange capacities and organic matter contents, and thus low lime requirements (<2 T/A). The Adams-Evans buffer is most appropriate for mid-Atlantic and coastal plain states.

Buffer pH - Also called lime requirement index, buffer pH is a chemical measure of the reserve acidity in a soil. This measurement, along with the soil pH, is used to determine the recommended rate of lime (CCE) to apply to the soil.

Buffering capacity - The ability of the soil to resist change in pH. It depends on reserve acidity (and therefore soil texture and organic matter).

CCE - calcium carbonate equivalent - An expression of the acid-neutralizing capacity of a carbonate rock relative to that for pure calcium carbonate. It is expressed as a weight percentage of calcium carbonate. Pure calcium carbonate is used as the standard with a neutralizing value of 100%. The actual CCE of most limestones will vary from this percentage due to impurities in the rock.

Reserve acidity - Acidity held in association with exchangeable aluminum, clay, and organic matter that can be released into the soil solution.

SMP buffer method - Shoemaker-McLean-Pratt buffer method - A method for determining the lime requirement of a soil. It was designed for use with soils that have large lime requirements and significant reserves of exchangeable aluminum. The SMP buffer is more commonly used in states in the northern section of the northeastern region. It has been shown in several studies to be inaccurate in poorly buffered, sandy soils; in soils with organic matter contents greater than 10%; or in soils with a predominance of kaolinite and aluminum and iron oxides in their clay fractions.

Soil pH - A measure of the relative acidity and alkalinity in the soil solution. A soil pH measurement, however, does not take into account the reserve acidity of the soil particles.

Soil texture - The relative proportions of sand, silt, and clay in a soil.

Acknowledgment: Appreciation is expressed to Dr. Stephanie Murphy, Director of Rutgers Soil Testing Laboratory, for reviewing this articling and providing helpful comments.

Precision Ag with Handheld Mobile GIS/GPS for NJ Farmers

Improving Farm Management and the Environment

Jack Rabin, Associate Director for Farm Services, NJAES and George Horzepa, Director, Division of Rural Resources, NJDA

Announcing precision ag project

Many New Jersey farmers are interested in using precision farming technologies, including GPS (Global Positioning Satellites) and GIS (Geographic Information Systems) on their farms. However, interest is tempered by a confusing array of hardware and software and a lack of integration of various components. A lack of technical assistance further inhibits applications to the smaller fields and farms common to New Jersey and to our diversified crops and livestock.

That is changing. Rutgers Cooperative Extension (RCE), with a two-year grant from the NJ Department of Agriculture, is participating with farmers in innovative pilot demonstrations to deploy handheld mobile GIS/GPS units with software and tech support. Approximately seven farmers have been recruited from a cross-section of New Jersey commodities and regions. A partnership with NOFA-NJ and EPA Region II will enable added participation from diversified organic growers and small livestock producers. We want to make precision tools accessible to all farmers, not just large growers with large fields.

The goal of this project is to improve farm profitability and viability through precise management. At the same time, the burdens of compliance can be eased. This funded project is consistent with NJ Secretary of Agriculture Charles Kuperus' smart growth strategy for farming in the Garden State.

Why precision ag for smaller diverse NJ farms and fields?

Managing information is a critical component of farming operations. Growers collect significant amounts of data for record keeping, cost analyses and farm inputs. In addition, state and/or federal agencies require increasing information about on-farm use of land, labor, water, nutrients, pesticides, and other resources. In many cases, farm records are used to support decisions for both business and environmental management.

Geographic Information Systems (GIS), a database method used to record and map spatial information, and its related technology tool Global Positioning Satellite systems (GPS), used to locate the latitude and longitude of features on the earth, have enabled farmers throughout the country to improve both on-farm and off-farm management.

Small computers connected to GPS receivers can do everything from field mapping and scouting to data entry and maintenance. Information collected in the field is easily maintained and integrated in the office. These tools can be applied to integrated pest management (IPM), integrated crop management (ICM), wildlife damage, irrigation scheduling, tracking costs and returns, nutrient management, small farm and watershed management and other problems.

The use of mobile GIS (i.e. handheld computers with GIS/GPS capabilities) is the first truly affordable high technology tool that can help the typical New Jersey farmer who farms a diversified small to medium size (50-600 acres) farm on the urban fringe. The advantages of the mobile GIS systems are many and include mobility, efficiency in data entry and maintenance, and cost. The future of precision agriculture in New Jersey will be through the adaptation of high technology mobile GIS/GPS-based mapping and database management systems.

As a foundation for developing a mobile GIS, a grower will develop an accurate base map of his/her farm with Rutgers Cooperative Extension's assistance. The base map provides a digital picture of the farm, and accurate area and perimeter measurements of the delineated fields and management units. Once a base map is established, relevant data will be added to the GIS. For example:

- Location of irrigation systems: pipes, valves, risers
- Yield and nutrient data at specific locations in a field
- Fertilizer and pesticide use data
- Detailed crop and field histories for record keeping.

Growers could improve field applications of fertilizers, fungicides, and pesticides utilizing mobile GIS. For example:

- Maps can be created to guide farm machinery in the field during an application to avoid overlap.
- Growers and field scouts can utilize mobile GIS systems to create accurate maps of pest, water, and weed damage "on the fly".

Growers can also employ variable rate technology (VRT). VRT is the ability to vary the rate of agricultural inputs such as seed, chemicals, and fertilizer in response to changing local conditions through the integration of GIS/GPS and farm equipment such as seeders and sprayers. Some examples where VRT technology can be successfully implemented are:

- Mapping perennial weeds that require pre-emergence applications. By utilizing weed maps, growers can apply herbicides only to the areas requiring these materials, rather than to entire fields.
- Mapping and creating management zones. Farmers can utilize nutrient information gathered through soil samples in fields to map out zones for differing treatments in fields.

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GIS/GPS FROM PAGE 3

The use of mobile GIS also gives farmers the ability to access field and crop histories on demand in the field or on the road. This may enhance sales of some commodities in the future, for export, or may become a procurement requirement to be a supplying vendor to certain customers. From our experience at Rutgers, we believe that these tools are more useful on perennial crops such as tree fruit, than annual crops.

Project participation and grower outreach

Training sessions and discussion of specific needs will be conducted on farms with individual growers. Appropriate hardware and software will be suggested that best meets the needs of each farming operation.

Each grower participant will receive hardware, licensed software, configuration and long-term technical support from Rutgers Cooperative Extension. Rutgers Cooperative Extension will use its existing hardware for initial farm mapping.

Participating growers will be taking part in periodic workshops with Rutgers Cooperative Extension and the Department of Agriculture to discuss their problems, frustrations, successes, and ideas. The program will be structured to highlight the approach taken on each farm with a complete description of the progress made. In the second year of the program, the workshops will be expanded to include presentations by growers and Rutgers staff, with a target audience including non-participating growers, county agents, agriculture agency employees, as well as out-of-state participants.

Contact for further information

For examples of equipment and applications to New Jersey agriculture, RCE, NJAES and the Grant F. Walton Center for Remote Sensing and Spatial Analysis at Cook College have a web site on agricultural research projects using GIS/GPS at:
http://www.crssa.rutgers.edu/projects/gps/web_page/web_page.html

For further information on this project, contact Jack Rabin at rabin@aesop.rutgers.edu or 732-932-5000 ext. 610. ❑

Physiological Disorders of Tomatoes

Wes Kline, Ph.D., Cumberland County Agricultural Agent and Stephen Garrison, Ph.D., Specialist in Vegetable Crops, Emeritus

The following conditions are really not diseases and applying a fungicide will not control them. We have been seeing several disorders this summer with the adverse weather conditions. The first tomato cluster has few if any tomatoes, which is the result of poor pollination. Following are some of the disorders found in early tomatoes this year.

Puffiness

If fruits appear square or angular, cut some open to see if there are seeds inside. The fruit that is set may have few seeds, resulting in poorly shaped fruit. Cavities may be empty or with little jelly. The reason is inadequate pollination caused by low (less than 55°F) or high (100°F or over) temperature, or improper fertilization (high nitrogen or low potassium). Proper fertilization will help minimize the disorder.

Gray wall, Blotchy Ripening or Yellow Eye

Irregular, grayish-brown blotchy areas (GW) can occur on the upper half or side of fruit. On ripening, fruit with GW or blotchy ripening (BR) have blotchy areas of green and yellow tissue surrounded by areas of normal red tissue. Greenish-white and white tissue is usually present in the fruit walls, and brown necrotic areas may be located around the vascular system of the fruit. Yellow-eye, a ring of yellow tissue surrounding the stem scar, often occurs in fruit with BR and internal white tissue.

GW and BR symptoms often appear on shaded fruit growing in the interior of dense, vegetative plants. Cloudy, moist, cool weather, high soil moisture, high nitrogen, soil compaction; and low potassium increase the incidence and severity of the disorders. Varieties differ in their susceptibility. Maintaining proper nutrient levels and variety selection will help reduce these problems. This is a good year to check how the early varieties perform.

Catface

Catfacing has been observed on first harvested fruit. The symptoms are enlarged scars and holes in the blossom end. Cold weather occurring about three weeks before flowering begins has been shown as one cause. There are differences among varieties for this disorder. Check to see if there are differences among the varieties being grown. ❑

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including wind direction. For our area, one useful site is the National Weather Service (NWS) Philadelphia/Mt. Holly forecast office: www.erh.noaa.gov/er/phi/index.html. Begin looking at Virginia and North Carolina catches in mid July for increases. When increases occur, look at the forecast wind direction. If sustained winds are from the south or southwest, there is the potential for significant CEW increases in New Jersey within 1-2 weeks. ❑

Weather Phenomena that Affect Corn Earworm in NJ

Kristian E. Holmstrom, Program Associate in Vegetable IPM

The **corn earworm**, (CEW), is a perennial pest of vegetable crops in New Jersey, including sweet corn, peppers, legumes, tomatoes, and lettuce. CEW adults are strong fliers, capable of speeds of over 5 m/sec without the aid of wind. Wind-aided CEW have been reported to travel great distances in a single night, depending on wind speed at the altitude the moths attain. CEW overwintering in New Jersey is inconsistent, with success only occurring over very mild winters. When local overwintering takes place, New Jersey experiences a May-June population of CEW adults. Typically however, CEW does not begin to hit significant levels until some time in July. At this time, New Jersey generally goes through a gradual increase in adult CEW population that may remain relatively stable for the remainder of the season, or suddenly increase with weather patterns that aid migration of this pest into the region.

Recently emerged CEW moths exhibit behavior that enables them to take advantage of prevailing winds. Shortly after sunset, CEW adults fly upward, frequently gaining altitudes of several hundred meters above ground level where wind speeds are higher. This behavior allows greater long-range dispersal. It is expected that the arrival of mid-to-late summer storms of tropical origin will bring with them a large number of CEW adults. Such systems are turbulent, and if traveling from the south or southwest, will aid in CEW transport to northern areas.

A review of CEW trap catches for the past four seasons reveals that the large, sudden increases in New Jersey were not associated with tropical storms. Rather, they were likely the result of local emergence combined with migratory individuals transported to our area following emergence events in states to the south. The transport system in each case was not a tropical storm, but appears to be an extended period of southerly winds during moth emergence. Breezes from the south and southwest are not uncommon in New Jersey during the summer. When conditions causing this weather pattern occur during CEW emergence in the mid-Atlantic region, however, we see dramatic increases in our adult CEW population. One critical period in New Jersey is the first two weeks of August. This follows CEW emergence to our south, and with favorable winds, moths may come to our area. A similar phenomenon may take place in early September. Much of what happens depends on weather patterns. Cold fronts approaching New Jersey from the north or northwest often result in abrupt decreases in CEW activity in our area. This may be a combination of lower temperatures and wind shifts to the north.

Pest maps created from the blacklight network operated by the Rutgers Cooperative Extension Vegetable IPM Program alerts growers in time to respond to CEW levels in New Jersey: www.pestmanagement.rutgers.edu/IPM/Vegetable/Pest%20Maps/maparchive.htm. It may be possible however, to anticipate these sudden increases in New Jersey by monitoring CEW trap catch activity from states to our south. Virginia Tech: www.vaes.vt.edu/tidewater/insectadvise, and North Carolina State University: http://ipm.ncsu.edu/current_ipm/pest_news.html are good sites, because they regularly post CEW blacklight catches, and because they are well to our south, giving us some advance warning of when emergence is occurring. It is also important to know the direction of prevailing winds during these CEW emergence periods. There are many sites posting current weather, summaries, and forecasts,

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Advisory for Potential Pest – Orange Striped Underwing

Joseph Ingerson-Mahar, Vegetable IPM Coordinator

This large European moth with dusky brown to black forewings and bright orange hindwings with a prominent black stripe was first found in Nova Scotia in 1979. Since then it has spread south and west and probably currently inhabits much of the eastern US. The caterpillar called an army cutworm is a general feeder attacking many different vegetable crops including carrots, cabbage, potatoes, strawberries as well as shrubs and grass. So far it hasn't been a significant pest in the northeast.

However, two weeks ago approximately 1500 moths of this species were collected in the blacklight trap at Eldora in southern New Jersey. Typical blacklight catches would be more like 20 to 30 moths per week. Growers and homeowners in the southern Cumberland County/northern Cape May area should be on the watch for feeding damage on their crops and ornamentals for the next month. Look for large egg masses (50 to 200 eggs) on the underside of leaves or on stems – initially the eggs are pale green but turn brown as they age. Newly hatched caterpillars would not eat much but the larger caterpillars which might reach 1 ¼ to 1 ½ inches would consume a considerable amount of plant material.

Caterpillar

Moth

The Climate of New Jersey

Reprinted from Office of the New Jersey State Climatologist, Rutgers, The State University of New Jersey: http://climate.rutgers.edu/stateclim.

New Jersey is located about halfway between the Equator and the North Pole, on the eastern coast of the United States. Its geographic location results in the State being influenced by wet, dry, hot, and cold airstreams, making for daily weather that is highly variable.

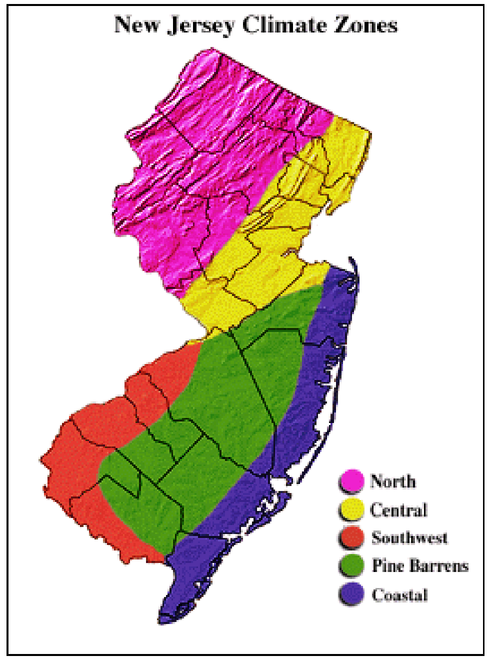
The Garden State is 166 miles long from north to south, and its greatest width is about 65 miles. While this may not seem too large, there is a marked difference in climate between Cape May in the south and the Kittatinny Mountains of northwestern New Jersey.

The dominant feature of the atmospheric circulation over North America, including New Jersey, is the broad, undulating flow from west to east across the middle latitudes of the continent. These "prevailing westerlies" shift north and south and vary in strength during the course of the year, exerting a major influence on the weather throughout the State.

Some general observations about the temperature and precipitation in New Jersey include:

1) Temperature differences between the northern and southern parts of the state are greatest in the winter and least in summer. All stations have registered readings of 100 degrees F or higher and have records of 0 degrees F or below.
2) Average number of freeze free days in the northern highlands is 163, 179 in the central and southern interior, and 217 along the seacoast.
3) Average annual precipitation ranges from about 40 inches along the southeast coast to 51 inches in north-central parts of the state. Many areas average between 43 and 47 inches.
4) Snow may fall from about October 15 to April 30 in the highlands and from about November 15 to April 15 in southern counties.
5) Most areas receive 25 to 30 thunderstorms per year, with fewer storms near the coast than farther inland. Approximately five tornadoes occur each year, and in general, they tend to be weak.
6) Measurable precipitation falls on approximately 120 days. Fall months are usually the driest with an average of eight days with measurable precipitation. Other seasons average between 9 and 12 days per month with measurable precipitation.

Although New Jersey is one of the smallest states in the Union, with a land area of 7,836 square miles, it has five distinct climate regions. The geology, distance from the Atlantic Ocean, and prevailing atmospheric flow patterns produce distinct variations in the daily weather between each of the regions. The five regions, Northern, Central, Pine Barrens, Southwest, and Coastal, are described below and shown in the accompanying figure.



Northern Zone

The Northern climate zone covers about one-quarter of New Jersey and consists mainly of elevated highlands and valleys which are part of the Appalachian Uplands. Surrounded by land, this region can be characterized as having a continental type of climate with minimal influence from the Atlantic Ocean, except when the winds contain an easterly component. Prevailing winds are from the southwest in summer and from the northwest in winter.

Being in the northernmost portion of the state, and with small mountains up to 1800 feet in elevation, the Northern Zone normally exhibits a colder temperature regime than other climate regions of the State. This difference is most dramatic in winter when average temperatures in the Northern Zone can be more than ten degrees Fahrenheit cooler than in the Coastal Zone. Annual snowfall averages 40 to 50 inches in the northern zone as compared with an average of 10-15 inches in the extreme south.

A storm track extending from the heart of the Mississippi Valley, over the Great Lakes, and along the St. Lawrence Valley is a major source of precipitation for this region. Coastal storms, with precipitation shields that reach well enough inland add to the precipitation totals.

The highlands and mountains in this area play a role in making the climate of the Northern Zone different from the rest of the state. Clouds and precipitation are enhanced by orographic effects. For instance, following a cold frontal passage, air forced to rise over the mountains, produces clouds, and even precipitation, while the rest of the state observes clear skies. The latter is due in part to subsiding air flowing off the highlands.

During the warm season, thunderstorms are responsible for most of the rainfall. Cyclones and frontal passages are less frequent during this time. Thunderstorms spawned in Pennsylvania and New York State often move into Northern New Jersey, where they often

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reach maximum development in the evening. This region has about twice as many thunderstorms as the coastal zone, where the nearby ocean helps stabilize the atmosphere.

The Northern Climate Zone usually has the shortest growing season, about 155 days. The average date for the last killing Spring frost is May 4. The first frost in Fall is around October 7. The exact dates vary significantly within the region as well as from year to year. Some valley locations have observed killing frost in mid-September and as late as mid-June.

Central Zone

The Central Zone has a northeast to southwest orientation, running from New York Harbor and the Lower Hudson River to the great bend of the Delaware River in the vicinity of Trenton. This region has many urban locations with large amounts of pollutants produced by the high volume of automobile traffic and industrial processes. The concentration of buildings and paved surfaces serve to retain more heat, thereby affecting the local temperatures. Because of the asphalt, brick, and concrete, the observed nighttime temperatures in heavily developed parts of the zone are regularly warmer than surrounding suburban and rural areas. This phenomenon is often referred to as a “heat island”.

The northern edge of the Central Zone is often the boundary between freezing and non-freezing precipitation during wintertime. In summer, the northern reaches often mark the boundary between comfortable and uncomfortable sleeping conditions. Areas to the south of the Central Zone tend to have nearly twice as many days with temperatures above 90 degrees F than the 15-20 commonly observed in the central portion of the state.

Pine Barrens Zone

Scrub pine and oak forests dominate the interior southern portion of New Jersey, hence the name, Pine Barrens. Sandy soils, which are porous and not very fertile, have a major effect on the climate of this region. On clear nights, solar radiation absorbed during the day is quickly radiated back into space, resulting in surprisingly low minimum temperatures. Atlantic City Airport, which is surrounded by sandy soil, can be 15-20 degrees cooler than the Atlantic City Marina on the bay, which is only about thirteen miles away.

The porous soil permits any precipitation to rapidly infiltrate and leave surfaces quite dry. Drier conditions allow for a wider range between the daily maximum and minimum temperatures, and makes the area vulnerable to forest fires.

Southwest Zone

The Southwest Zone lies between sea level and approximately 100 feet above sea level. The close proximity to Delaware Bay adds a maritime influence to the climate of this region. The Southwest has the highest average daily temperatures in the state and without sandy soils, tends to have higher nighttime minimum temperatures than in the neighboring Pine Barrens.

This region receives less precipitation than the Northern and Central regions of the state as there are no orographic features and, it is farther away from the Great Lakes-St. Lawrence storm track. It is also far enough inland to be away from the heavier rains from some coastal storms, thus it receives less precipitation than the Coastal Zone.

Prevailing winds are from the southwest, except in winter when west to northwest winds dominate. High humidity and moderate temperatures prevail when winds flow from the south or east. The moderating effect of the water also allows for a longer growing season. Autumn frosts usually occur about four weeks later here than in the North and the last spring frosts are about four weeks earlier, giving this region the longest growing season in New Jersey.

Coastal Zone

In the Coastal Zone, continental and oceanic influences battle for dominance on daily to weekly bases. In autumn and early winter, when the ocean is warmer than the land surface, the Coastal Zone will experience warmer temperatures than interior regions of the state. In the spring months, ocean breezes keep temperatures along the coast cooler. Being adjacent to the Atlantic Ocean, with its high heat capacity (compared to land), seasonal temperature fluctuations tend to be more gradual and less prone to extremes.

Sea breezes play a major role in the coastal climate. When the land is warmed by the sun, heated air rises, allowing cooler air at the ocean surface to spread inland. Sea breezes often penetrate 5-10 miles inland, but under more favorable conditions, can affect locations 25-40 miles inland. They are most common in spring and summer.

Coastal storms, often characterized as nor’easters, are most frequent between October and April. These storms track over the coastal plain or up to several hundred miles offshore, bringing strong winds and heavy rains. Rarely does a winter go by without at least one significant coastal storm and some years see upwards of five to ten. Tropical storms and hurricanes are also a special concern along the coast. In some years, they contribute a significant amount to the precipitation totals of the region. Damage during times of high tide can be severe when tropical storms or nor’easters affect the region.

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