Attachment 6

Berry Nutrition

Fact Sheets Blackberries | Blueberries | Black Raspberries| Red Raspberries | Strawberries

Source:
Oregon Raspberry & Blackberry Commission
http://berryhealth.fst.oregonstate.edu/health_healing/fact_sheets/index.htm

Scientists have found berries have some of the highest antioxidant levels of any fresh fruits (measured as ORAC), and kale and spinach are the only vegetables with ORAC values as high as fresh, delicious berries. Fresh berries are some of the most powerful (and delicious) disease-fighting foods available.

Anthocyanins
Color pigments in berries that are powerful antioxidants. Blue, purple, and red color has been associated with a lower risk of certain cancers, urinary tract health, memory function, and healthy aging.

Antioxidants
Substances that protect the body by neutralizing free radicals or unstable oxygen molecules, which can damage the cells and are a major source of disease and aging.

Catechins
Catechins are flavonols that support the antioxidant defense system.Catechins found in caneberries are very similar to those found in green tea which studies show may contribute to cancer prevention. The catechins content found in 100 grams (about 3 /4 cup) is as follows: red raspberries, .83 milligrams and Evergreen blackberries, 1.4 milligrams.

Dietary Fiber
Found only in plant foods, fiber helps maintain a healthy GI tract, lowers blood cholesterol, reduces heart disease and may prevent certain types of cancers.

Ellagic Acid
A phenolic compound known as a potent anti-carcinogen which has anti-viral and anti-bacterial properties. Scientists feel ellagic acid plays a major roll in cancer prevention and tumor reversal.

Fiber
A carbohydrate-like substance found only in plants. Dietary fiber helps maintain a healthy
gastrointestinal tract and may help prevent certain types of cancers. It can also help to reduce blood cholesterol levels and lower the risk of heart disease.

Gallic Acid
A potent antioxidant also found in black tea and red wine, shown in tests to inhibit cell proliferation and cell death in prostrate cancer cells.

ORAC (Oxygen Radical Absorbance Capacity)
ORAC (Oxygen Radical Absorbance Capacity) values are a measure of the antioxidant activity. Specifically, it measures the degree and length of time it takes to inhibit the action of an oxidizing agent. Antioxidants inhibit oxidation which is known to have a damaging effect on tissues. Studies now suggest that consuming fruits and vegetables with a high ORAC value may slow the aging process in both body and brain. Antioxidants are shown to work best when combined; the presence of fiber and other plant compounds enhance the health benefit. For this reason, a nutraceutical source is a more viable antioxidant option than that of a dietary supplement.
Single servings of fresh or freshly cooked fruits and vegetables supply an average of 600-800 ORAC units. Scientists believe that increasing intake of foods that provide 2000-5000 units per day may be needed to increase serum and tissue antioxidant activity sufficiently to improve health outcomes.

Phytochemicals
Phytochemicals are naturally occurring antioxidants in plants that add flavor, color pigments and scent, and they are abundant in all types of fruits and vegetables, particularly berries.
The pigments that give berries their rich red to blue, black and purple colors are a type of phytochemical that has been shown to have significant disease-fighting, cell-protecting antioxidant capacity.

Quercetin
A flavonol that works as both an anti-carcinogen, an antioxidant and protects against cancer and heart disease.

Rutin
A bioflavonoid that promotes vascular health, helps to prevent cell proliferation associated with cancer and has anti-inflammatory and anti-allergenic properties.

Salicylic Acid
The salicylic acid found in Oregon caneberries may prove to have the same protective effect against heart disease as aspirin. Aspirin is a closely related compound know to pharmacists as salicylic acid acetate. The therapeutic successes of small daily doses of aspirin to inhibit atherosclerosis suggest the possibility that salicylic acid consumed in foods may provide a similar benefit. A 100-gram serving (about 3 /4 cup) of red raspberries contains around 5 milligrams of salicylic acid.

Vitamin C
A water soluble vitamin that functions as a powerful antioxidant.

Attachment 7

National Lightning Institute (Human Safety)

NLSI

~ National Lightning Safety Institute ~

October 16, 2011

Section 4.2

Multi-Agency Recommendations for Lightning Safety

American Meteorological Society Conference
Phoenix, Arizona, 1998

In 1998, twelve business and government organizations discussed, drafted and jointly published a cohesive and unified lightning safety document in the public interest. Members of the **Lightning Safety Group** (LSG):

- Brian Bennett, *Assistant Athletic Trainer*
  The College of William & Mary
- Leon Byerley
  Lightning Protection Technology
- Mary Ann Cooper, MD, FACEP, *Lightning Injury Research Program*
  The University of Illinois at Chicago
- Ken Cummins, Ph.D., *Vice President Engineering*
  Global Atmospherics, Inc.
- Ronald L. Holle, *Research Meteorologist*
  National Severe Storms Laboratory, NOAA
- Ken Howard, *Research Meteorologist*
  National Severe Storms Laboratory, NOAA
- Richard Kithil, *President/CEO*
  National Lightning Safety Institute
- E. Philip Krider, Ph.D., *Department of Atmospherics Sciences & Institute of Atmospheric Physics*
  The University of Arizona
- Lee C. Lawry, *Product Manager*
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- Raúl E. López, Ph.D., *Research Meteorologist*
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- Bruce Lunning, CSP, CPCU, ARM, *Senior Loss Control Specialist*
  St. Paul Fire and Marine Insurance Co.
- John T. Madura, *Manager, KSC Weather Office*
  NASA
- Marcus McGee, *President*
  Quality Protection Systems, Inc.
- William P. Roeder, Chief Staff Meteorologist
  Patrick, AirForce Base
- Jim Vavrek *Science Teacher*
  Henry W. Eggers Middle School
- Christoph Zimmermann, *Safety Management*
  Global Atmospherics, Inc.

LIGHTNING SAFETY GROUP RECOMMENDATIONS

ABSTRACT

On average, lightning causes more casualties annually in the US than any other storm related phenomena, except floods. Many people incur injuries or are killed due to misinformation and inappropriate behavior

during thunderstorms. A few simple precautions can reduce many of the dangers posed by lightning. In order to standardize recommended actions during thunderstorms, a group of qualified experts from various backgrounds collectively have addressed personal safety in regard to lightning, based on recently improved understanding of thunderstorm behavior.

This "Lightning Safety Group" (LSG) first convened during the 1998 American Meteorological Society Conference in Phoenix, Arizona to outline appropriate actions under various circumstances when lightning threatens.

KEY CONCLUSIONS

The seemingly random nature of thunderstorms cannot guarantee the individual or group absolute protection from lightning strikes, however, being aware of, and following proven lightning safety guidelines can greatly reduce the risk of injury or death.

The individual is ultimately responsible for his/her personal safety and has the right to take appropriate action when threatened by lightning. Adults must take responsibility for the safety of children in their care during thunderstorm activity.

AREAS ADDRESSED BY THE LSG

1. Identifying safe and not so safe locations during thunderstorm activity.
2. Safety Guidelines for Individuals.
3. Safety Guidelines for Small Groups and/or when the Evacuation Time is less than Ten Minutes.
4. Safety Guidelines for Large Groups and/or when the Evacuation Time is more than Ten Minutes.
5. Important Components of an Action Plan.
6. First Aid Recommendations for Lightning victims.

Safer Locations during Thunderstorms and Locations to Avoid

- No place is absolutely safe from the lightning threat, however, some places are safer than others.
- Large enclosed structures (substantially constructed buildings) tend to be much safer than smaller or open structures.
- The risk for lightning injury depends on whether the structure incorporates lightning protection, construction materials used, and the size of the structure (see NFPA 780, Appendix E & H).
- In general, fully enclosed metal vehicles such as cars, trucks, buses, vans, fully enclosed farm vehicles, etc. with the windows rolled up provide good shelter from lightning. Avoid contact with metal or conducting surfaces outside or inside the vehicle.

AVOID being in or near:

High places and open fields, isolated trees, unprotected gazebos, rain or picnic shelters, baseball dugouts, communications towers, flagpoles, light poles, bleachers (metal or wood), metal fences, convertibles, golf carts, water (ocean, lakes, swimming pools, rivers, etc.).

When inside a building **AVOID**:

Use of the telephone, taking a shower, washing your hands, doing dishes, or any contact with conductive surfaces with exposure to the outside such as metal door or window frames, electrical wiring, telephone wiring, cable TV wiring, plumbing, etc.

Safety Guidelines for Individuals

Generally speaking, if an individual can see lightning and/or hear thunder he/she is already at risk. Louder or more frequent thunder indicates that lightning activity is approaching, increasing the risk for lightning injury or death. If the time delay between seeing the flash

(lightning) and hearing the bang (thunder) is less than 30 seconds, the individual should be in, or seek a safer location (see Safer Locations during Thunderstorms and Locations to Avoid). Be aware that this method of ranging has severe limitations in part due to the difficulty of associating the proper thunder to the corresponding flash.

High winds, rainfall, and cloud cover often act as precursors to actual cloud-to-ground strikes notifying individuals to take action. Many lightning casualties occur in the beginning, as the storm approaches, because people ignore these precursors. Also, many lightning casualties occur after the perceived threat has passed. Generally, the lightning threat diminishes with time after the last sound of thunder, but may persist for more than 30 minutes. When thunderstorms are in the area but not overhead, the lightning threat can exist even when it is sunny, not raining, or when clear sky is visible.

When available, pay attention to weather warning devices such as NOAA weather radio and/or credible lightning detection systems, however, do not let this information override good common sense.

Considerations for Small Groups and/or when the Evacuation Time is less than Ten minutes

An action plan must be known in advance by all persons involved (see Important Components to an Action Plan, P.5). School teachers, camp counselors, lifeguards, and other adults must take responsibility for the safety of children in their care.

Local weather forecasts, NOAA weather radio, or the Weather Channel should be monitored prior to the outdoor event to ascertain if thunderstorms are in the forecast. Designate a responsible person to monitor forecasted weather as well as to observe on-site developments to keep everyone informed when potential threats develop.

Recognize that personal observation of lightning may not be sufficient; additional information such as a lightning detection system or additional weather information may be required to ensure consistency, accuracy, and adequate advance warning.

Even though technology and instrumentation have proven to be effective, they cannot guarantee safety. Instrumentation can be used to enhance warning during the initial stages of the storm by detecting lightning in relation to the area of concern. Advance notification of the storm's arrival should be used to provide additional time to seek safety. Detectors are also a valuable tool to determine the "All Clear" (last occurrence of lightning within a specified range), providing a time reference for safe resumption of activities.

Safety Guidelines for Large Groups and/or when the Evacuation Time is more than Ten minutes

An action plan must be known in advance by all persons involved (see Important Components to an Action Plan). Adults must take responsibility for the safety of children in their care.

Local weather forecasts, NOAA weather radio, or the Weather Channel should be monitored prior to the outdoor event to ascertain if thunderstorms are in the forecast. During the event, a designated responsible person should monitor site relative weather condition changes.

Personal observation of the lightning threat is not adequate; additional information including detecting actual lightning strikes and monitoring the range at which they are occurring relative to the activity is required to ensure consistency, accuracy, and adequate advance warning.

Even though technology and instrumentation have proven to be effective, they cannot guarantee safety. Instrumentation can be used to enhance warning during the initial stages of the storm by detecting lightning in relation to the area of concern. Advance notification of the storm's arrival should be used to provide additional time to seek safety. Detectors are

also a valuable tool to determine the "All Clear" (last occurrence of lightning within a specified range), providing a time reference for safe resumption of activities.

When larger groups are involved the time needed to properly evacuate an area increases. As time requirements change, the distance at which lightning is noted and considered a threat to move into the area must be increased. Extending the range used to determine threat potential also increases the chance that a localized cell or thunderstorm may not reach the area giving the impression of a "false alarm".

Remember, lightning is always generated and connected to a thundercloud but may strike many miles from the edge of the thunderstorm cell. Acceptable downtime (time of alert state) has to be balanced with the risk posed by lightning. Accepting responsibility for larger groups of people requires more sophistication and diligence to assure that all possibilities are considered.

Important Components of an Action Plan

Management, event coordinators, organizations, and groups should designate a responsible, person(s) to monitor the weather to initiate the evacuation process when appropriate. Monitoring should begin days and even hours ahead of an event.

A protocol needs to be in place to notify all persons at risk from the lightning threat. Depending on the number of individuals involved, a team of people may be needed to coordinate the evacuation plan. Adults must take responsibility for the safety of children in their care.

Safer sites must be identified beforehand, along with a means to route the people to those locations. School buses are an excellent lightning shelter that can be provided (strategically placed around various locations) by organizers of outdoor events, with larger groups of people and larger areas, such as golf tournaments, summer day camps, swim meets, military training, scout groups, etc.

The "All Clear" signal must be identified and should be considerably different than the "Warning" signal.

The Action Plan must be periodically reviewed by all personnel and drills conducted.

Consider placing lightning safety tips and/or the action plan in game programs, flyers, score cards, etc., and placing lightning safety placards around the area. Lightning warning signs are effective means of communicating the lightning threat to the general public and raise awareness.

First Aid Recommendations for Lightning victims

Most lightning victims can actually survive their encounter with lightning, especially with timely medical treatment. Individuals struck by lightning do not carry a charge and it is safe to touch them to render medical treatment. Follow these steps to try to save the life of a lightning victim:

First:

Call 911 to provide directions and information about the likely number of victims.

Response:

The first tenet of emergency care is "make no more casualties". If the area where the victim is located is a high risk area (mountain top, isolated tree, open field, etc.) with a continuing thunderstorm, the rescuers may be placing themselves in significant danger.

Evacuation:

It is relatively unusual for victims who survive a lightning strike to have major fractures that would cause paralysis or major bleeding complications unless they have suffered a fall or been thrown a distance. As a result, in an active thunderstorm, the rescuer needs to choose whether evacuation from very high risk areas to an area of lesser risk is warranted and should not be afraid to move the victim rapidly if necessary. Rescuers are cautioned to minimize their exposure to lightning as much as possible.

Resuscitation:

If the victim is not breathing, start mouth to mouth resuscitation. If it is decided to move the victim, give a few quick breaths prior to moving them. Determine if the victim has a pulse by checking the pulse at the carotid artery (side of the neck) or femoral artery (groin) for at least 20-30 seconds. If no pulse is detected, start cardiac compressions as well. In situations that are cold and wet, putting a protective layer between the victim and the ground may decrease the hypothermia that the victim suffers which can further complicate the resuscitation. In wilderness areas and those far from medical care, prolonged basic CPR is of little use: the victim is unlikely to recover if they do n ot respond within the first few minutes. If the pulse returns, the rescuer should continue ventilation with rescue breathing if needed for as long as practical in a wilderness situation. However, if a pulse does not return after twenty t o thirty minutes of good effort, the rescuer should not feel guilty about stopping resuscitation.

CONCLUSION

Avoid unnecessary exposure to the lightning threat during thunderstorm activity. Follow these safety recommendations to reduce the overall number of lightning casualties. An individual ultimately must take responsibility for his or her own safety and should take appropriate action when threatened by lightning. School teachers, camp counselors, coaches, lifeguards, and other adults must take responsibility for the safety of children in their care. A weather radio and the use of lightning detection data in conjunction with an action plan are prudent components of a lightning warning policy,
especially when larger groups and/or longer evacuation times are involved.

Attachment 8

CT Climate (Thunderstorms)

Connecticut Climate

Interior portions of Connecticut have a humid continental climate, while the Connecticut shoreline (the state's southern four counties) has a borderline humid subtropical climate (sometimes statistically meeting this climate's criteria, sometimes not) with seasonal extremes tempered by proximity to the Atlantic Ocean. The city of Bridgeport (on Long Island Sound), like most other areas in metropolitan New York, typically falls within the humid subtropical climate zone under the Köppen Climate Classification system. Hartford (35 miles inland) has a humid continental climate. Consistent with its coastal reputation, Connecticut is a moderately sunny state, averaging between 2,400 and 2,800 hours of sunshine annually.[22]

Winters are generally considered to be cold, with average temperatures ranging from 38 °F (3 °C) in the maritime influenced southeast to 29 °F (−2 °C) in the northwest in January. The average yearly snowfall is about 20–60"(54–189 cm) across the state, with higher totals in the northwest. Spring has variable temperatures with frequent rainfall. Summer is hot and humid throughout the state, with average highs in New London of 81 °F (27 °C) and 87 °F (31 °C) in Windsor Locks. Fall months are mild and bring colorful foliage across the state in October and November. During hurricane season, tropical cyclones occasionally affect the region. Thunderstorms are most frequent during the summer, occurring on average 30 times annually. http://en.wikipedia.org/wiki/State_of_ConnecticutThese storms can be severe, and the state usually averages one tornado per year.[23] Connecticut's warmest temperature is 106 °F (41 °C) which occurred in Danbury on July 15, 1995; the coldest temperature is −32 °F (−36 °C) which occurred in Falls Village on February 16, 1943 and Coventry on January 22, 1961.[24]

http://en.wikipedia.org/wiki/State_of_Connecticut

Attachment 9

National Lightning Safety Institute

Lightning Safety for Telecommunication Facilties

~ National Lightning Safety Institute ~

October 16, 2011

Section 5.5.6

Lightning Protection for Telecommunications Facilities

By Richard Kithil, President & CEO, NLSI
Presented at the International Lightning Detection Conference, Tucson, AZ, April 2006

1. Summary

In 2004-2005, a major national insurance company was receiving lightning-related claims and paying compensation in the six figures to E911 Emergency Radio Operations customers across the U.S. Why were losses seemingly unrelated to lightning distribution, times of year, latitudes, elevations, ages of equipment, and the like? NLSI was engaged to visit sites in CO, TX, TN, AL, LA, GA, MI, and IL to investigate cause, effect, and remediation subjects. The purpose of this paper is to describe findings together with application of known mitigation defenses in general terms for application to telecommunications facilities.

2. Lightning Protection Sub-systems

A hierarchy of recognized application methods should be applied according to site realities. This matrix is depicted below:

	Direct Strike	Indirect Strike	Exterior Location	Interior Location	People Safety	Structure Safety
Air Terminals	Yes	No	Yes	No	No	Yes
Down Conductors	Yes	No	Yes	Yes	No	Yes
Bonding	Yes	Yes	Yes	Yes	Yes	Yes
Grounding	Yes	Yes	Yes	Yes	Yes	Yes
Shielding	Yes	Yes	Yes	Yes	Yes	Yes
Surge Protection	Yes	Yes	Yes	Yes	Yes	Yes
Detection	Yes	Yes	Yes	Yes	Yes	Yes

Policies & Procedures	Yes	Yes	N/A	N/A	Yes	Yes

3. Practical Guidelines

A generalized, practical use of the above matrix, where relevant for telecom sites, is presented in this section.

3.1 Air Terminals

Lightning usually terminates on grounded objects sticking up in the air. Franklin rods are air terminals. Old Ben's designs, developed in 1752, divert lightning from rods in the air via conductors to rods in the ground, protecting important assets. This part of a lightning protection system (LPS) is based upon the principles of Path of Least Impedance. Nowadays, some vendors are promoting unconventional air terminal designs (Charge Transfer Array/Early Streamer Emitter, etc.), seeking to gain advantage over competitors. *Caveat emptor.* Of course, should lightning strike across the street from a telecom center and couple into its sensitive electronics via underground wiring, water pipes, buried conduits, and so on, then no type of air terminal sub-system has performed and it has no value. On telecom towers, ordinary sacrificial rods can protect sensitive antennae. In the main, the tower is the air terminal.

3.2 Bonding

Without proper bonding, all other elements of the lightning protection system are useless. Bonding of all metallic conductors in a telecom facility assures everything is at equal potential. When lightning strikes, all electrical equipment voltages will rise and fall at the same potentials. This protects against unequal voltages in separate sensitive signal and data systems. Bonding should connect all conductors to the same "Mother Earth." A partial listing includes antenna towers, shields on incoming coaxial cables, cable trays, cabinets and racks, computer room signal reference grids, telephone room equipment, conduits carrying various AC power and low-voltage DC current conductors, and AC power bus bars. Not convinced bonding is important? Check out NEC 250.90 through 250.104 for more details.

A recent inspection revealed a bare copper ground wire in contact with an interior electrical conduit. The result: A visible arcing mark caused by lightning's "flashover" with resulting destruction of nearby low voltage equipment. The solution: Either bond the two adjacent grounds together, or (better) use only insulated, not bare, wire for interior bonding.

3.3 Grounding

Low-resistance grounding provides an efficient destination for the "lightning beast." If site soils are composed of sand or rock, they are resistive, not conductive. If surrounding soils are clays or dirt with moisture present, they likely are conductive. "Good Grounds" are achieved by volumetric efficiencies. We recommend buried bare 4/0 copper wire – the so-called ring electrode or ring ground. Cadwelding® all-ground references adjacent to buildings should include security fences, tower legs, and all other adjacent metallic objects. The National Electrical Code Section 250 describes the perimeter ring concept as well as other grounding designs, such as rods, plates, water pipes (beware plastic pipes underground), metal frame of buildings, and concrete-encased electrodes. Choose your grounding design based upon localized conditions and the amount of available real estate at your location. Good grounding largely is a function of volumetric efficiencies. NEC 250.56 suggests a target earth resistivity number of 25 ohms for one ground rod. Lower is better. Yet sometimes 50+ ohms will be OK.

Another recent inspection, using an AEMC 3730 Ground Resistance Tester, showed grounding measurements of 450 ohms at a power pole ground wire drop. The result: Lightning bypassed this high-resistance ground and instead went into the telecom building via the overhead phase lines. The solution: Re-work power pole grounds to achieve lower ohms target resistance.

3.4 Surge Suppression

Surge suppression devices (SPDs aka TVSS) all function either by absorbing the transient as heat or crowbaring the transient to ground (or some combination thereof). They should be installed at main panel

entries, at critical branch or secondary panels, and at plug-in outlets where low-voltage transformers convert AC power to DC current and voltage. SPDs also should be installed at signal and data line building entry points for critical electronic equipment. Included here are Cat. 5/6, coaxial lines, and twin lead and other copper wire circuits. Telephone punch blocks should be SPD-protected. Beware of the junk SPDs that proliferate in the marketplace. Beware of counterfeit or false UL and IEEE labeling. Beware of the "it sounds too good to be true" marketing hype employed by some vendors. Consider panel SPDs that have capabilities to remotely signal their operational performance. SPDs rank right behind bonding in the hierarchy of important steps to mitigate the lightning hazard.

Surge suppression is a complex subject, with many questions. Where and how to install SPDs? What SPD internal technologies are important? Which SPD codes and standards are important and which are vendor-influenced? How do UPS-protected circuits play into surge protection? What about fibre optic conductor vulnerabilities? For these and other considerations, find an authority not employed by SPD vendors for impartial and verifiable guidance. Feeling lucky and want to play the odds that lightning or power company surges never will enter your telecom facility? Just wait and Mother Nature will do the testing for you!

3.5 Codes and Standards

There aren't any lightning protection guidelines specific for the telecom industry. It is important that the wireless community consider adopting a contemporary lightning protection recipe. Taking a few items from NFPA 99 and NFPA 780, also adding in Motorola R56, stirring in some ingredients from IEEE 142 and IEEE 1100, mixing well with FAA-STD-019d and NASA-KSC-E0012E, and sprinkling on top some NEC 250 & 517 information would result is a very good final product for a pragmatic lightning protection standard. Some leadership is needed here. Please step forward...

4. Conclusion

Lightning is arbitrary, capricious, and stochastic – with odds of a strike approaching 1:1,000,000. A detailed and professional risk assessment exercise may produce meaningless guidance. Most people, when confronted with a conundrum of very low risk vs. very high consequences will chose to take no action towards lightning protection (perhaps because it's the path of least resistance). With emergency radio networks, the equation is different. When the communications net goes off-line, for whatever reason, the result is that ambulance, fire, and police resources and responses are compromised. This is an untenable situation that demands lightning protection for telecommunications facilities.

5. References

- Consulting projects with reports to clients, NLSI 2004-2005.
- "Going Beyond the Codes, An Expanding List of On-The-Job Tips," NLSI 2006.
- "Lightning Protection for Engineers: 2006," NLSI, Louisville, CO 80027, 2009.
