Spuria News

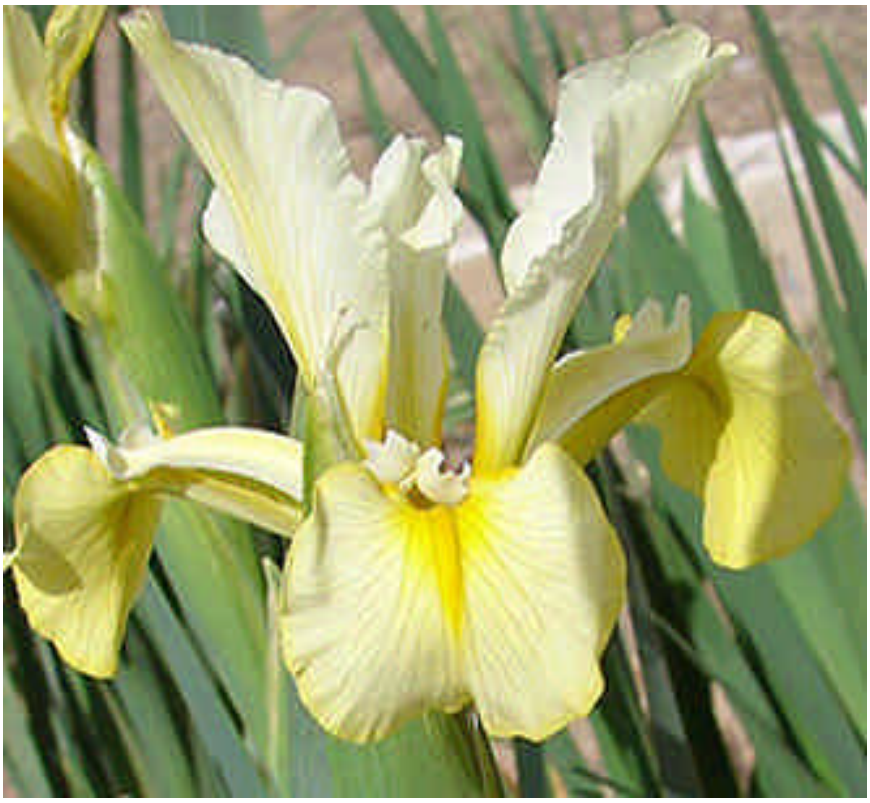
Winter 2009

The Spuria Iris Society is a section of the American Iris Society

2008 AIS Awards

Eric Nies Medal

'Elfin Sunshine'
B. C. Jenkins - 43 votes



Award of Merit

'Kiss of Carmel'
A & D Cadd - 35 votes

'Speeding Star'
A & D Cadd - 27 votes

Honorable Mention

'Solar Fusion'
L. Walker - 19 votes

'Golden Ducat'
A & D Cadd - 15 votes

'Saint Patrick's Gold'
A & D Cadd - 14 votes

'Star Rider'
A & D Cadd - 14 votes

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The Spuria Iris Society is a section of the American Iris Society and holds a Board of Directors meeting each year at the AIS National Convention. Your participation is welcomed and encouraged

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Spuria Slide Show

There are two (2) new & updated presentations available for rent at $12 for each set or $24 for both, make checks payable to SIS. Ordering club will pay for return postage. All carousels must be returned no more than one (1) week after meeting.
Please contact:

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Membership Rates

Single annual..... $9
Single triennial.....$20
Family annual..... $12
Family triennial.....$24
Overseas annual $12
Overseas triennial $30

Membership Renewals

For memberships that are expiring, the address label on the newsletter envelope will reflect the expiration/renewal date (upper right hand corner).

There are two ways to join or renew memberships:

1. Renew electronically through the AIS website (*www.irises.org*) using either Visa, Master Card or Pay Pal

2. Renew by US mail sending the appropriate funds (check made out to Spuria Iris Society) to the membership chairman, include your name and address (required). We ask you also include your phone number and e-mail address.

The Spuria Checklist

The Spuria Iris Society is **not** taking orders for the Spuria Checklist.

Plans are to revise the checklist with updated introductions. When that task is completed, printing (and sales) will resume.

The Spuria website is at:
www.spuriairis.com

President's Message

by Nancy Price

Guest irises for the Spuria Mini-Convention have been exposed to many days of 90 degree weather this last summer. Autumn was mild in the Pacific Northwest, but winter came in with a vengeance. Much of the Portland area received 18 inches of snow with rain and wind accompanying throughout a week which seemed a whole lot longer. Today is windy again with a mix of snow and rain. The soil is super saturated with water, making for flooding and mud slides in the area.

Most all guest spuria are showing good increase, with still a year of growing before iris guests arrive to "Ooh" and "Aah" the spuria varieties. There will be four gardens with between 40 and 50 spuria guest cultivars to visit. It will be a two day trek on Saturday and Sunday. Judges training will be offered in one of the gardens.

'Elfin Sunshine' (Jenkins '98, SPU) won the Eric Nies Medal in 2008. Congratulations to Charlie Jenkins for giving us this beautiful yellow spuria. Elfin Sunshine is one of the first iris to bloom in our garden and is a good performer.

The popularity pool is open. It has been added to the website. Cut off date for votes is the end of March. Feel free to add personal opinions to your submissions. Your opinions or comments may be valuable to another spuria lover.

Our next meetings will be in Kansas City, May 11-16, 2009. As usual, there will be a board meeting on one day and a Program for the General Session on the next day. Bring your questions to the session. I'm sure the speaker will be generous with answers. Looking forward to seeing you there.

Nancy Price
SIS President

New Members

The Spuria Iris Society welcomes the following new members:

• Gary & Sharon Petterson - Gilbert, AZ

2009 AIS National Convention

May 11 - 16, 2009
Overland Park, Kansas
Convention Hotel - Doubletree Hotel Overland Park

Note: 2009 AIS convention information and registration forms can be found on the hosting club convention website www//:kciris.org

Spuria Iris Society Business

Board Meeting
May 12, 2009 at 2 - 3 pm

Spuria Section Meeting
May 14, 2009 at 6 - 7 pm
The guest speaker will be Jim Hedgecock.

Note: Exact meeting room information will be available at the AIS convention.

Other Spuria News

Other Spuria awards (Runners Up) not mentioned on the cover of this newsletter are:

Eric Nies Runners Up:

• 'Missouri Moonlight' - O. D. Niswonger (38 votes)
• 'Missouri Autumn' - O. D. Niswonger (34 votes)

Award of Merit Runners Up:

• 'Hocka Hoona' - P. DeSantes (25 votes)
• 'Whitewater River' - O. D. Niswonger (22 votes)

Honorable Mention Runners Up:

• 'Chocolate Dreams' - A & D Cadd (13 votes)
• 'California Gold Rush' - A & D Cadd (12 votes)

A reminder to all Spuria members, the Spuria Convention is planned for June 2010 in Portland, keep your calendars open for the Spuria convention next year.

Any members have:

- Old Spuria photos or slides you no longer want to keep in that basement box? or
- Old Spuria newsletters (especially those dated prior to 1974)?

The Editor of the Spuria News is interested in them for several reasons:

- The photos / slides are needed to update the checklist (provided the photo is correctly identified)

- Slides could be used for the Spuria slide show inventory.
- Old newsletters are being scanned electronically for a historic value and reference for future newsletters. To date most newsletters since 1974 have been electronically scanned.

If any member should have older photos, slides or newsletters and are willing to loan or contribute to the Spuria Iris Society, please contact the Spuria News Editor at *djurn@prodigy.net*.

Missouri Rambling

By Jim Hedgecock

I hope this column finds all of you well and most of all I hope all of you are weathering the financial crisis that seems to be griping our nation. I promised myself that my new years resolution would be to keep a positive attitude for this year. Try it and quit watching those extremely negative news broadcasts. Just turn them off, we need some good news, not that negative crap.

I am finally introducing the first of my own spuria introductions for this year along with one for Charlie Jenkins. I held back for the last 3 years or so to reevaluate these and several others that are nearing introduction. We have at least 2 distinct colors that we think are new to commerce and tons more that are different and improvements from what we have seen. Also those of you that have seen one of my spuria slide shows have seen slides of several new mini spurias that we will be introducing from Charlie's things.

Darol Jurn and I have started work again on the updated Spuria R&I list. Keep your fingers crossed and maybe we can have it by the convention next year in Portland. I want to give you a heads up on the Kansas City convention this year. It will be a very good tall bearded convention, but don't expect to see spurias in bloom. Our spurias bloom as much as 3 weeks to a month later here than the convention dates and it won't vary that much to hope to see them in bloom. I mention this, because someone called me and said they wanted to come to the farm to see spurias.

I hope those of you who are really interested in spurias will try to start saving your money now for the Portland convention next year. It should prove to be a very good mini convention.

We have been selling more spurias every year to florists and landscapers. I hope those of you that sell spurias are continuing to ship the rhizomes wet. If you don't you are just inviting problems with your customers. Sure it's more trouble for you, but it makes for practically no losses. Just wrap them in a paper towel and dip them in water and wring them out real good and bag them. Don't ship them overly wet. I will compare my shipping wet to anyone's that ships dry and I will have less losses by a long shot.

Have a great spring and remember a positive attitude will make your day so much better.

God bless you and your gardens.

Respectfully,
Jim Hedgecock
Comanche Acres Iris Gardens.

Editor's Corner

By Darol Jurn

On the the subject of soil microbes (see article in this newsletter), during the past two seasons I have been amending my soils differently from previous years. I now attempt to fertilize according to the existing soil conditions based on soil samples, in addition I adjust soil pH to maximize the plants ability to absorb the nutrients and I treat my soils with micro-nutrients and micro-organisms. There is a fourth item I need to add to my soils, that being more compost (most Arizona soils lack sufficient organic material). For the microbes and micro-nutrients I have been using a product called “Great Big Plants”. It comes in a liquid form and I apply it through a hose sprayer at the appropriate dilution rate once during the early growing season. This is the second growing season that I have been using “Great Big Plants” on my vegetable garden and Iris beds with applications of soil sulfur to neutralize the soil. The results from my vegtable garden have been nothing less than impressive. The past two years our spinach and beets were noticeably healthier plants and provided a higher yield for a longer period. In addition this year our cauliflower produced very large heads. Based on our results, I am a firm believer of providing soil amendments in the form of appropriate fertilizers, micro-nutrients and microbes.

Last summer I received several Spuria rhizomes from my local club members and planted them in my garden in the fall. They are doing very well in fact too well..... I received 16 different Spuria cultivars; of those, six are currently pushing bloom stalks with 5 of them currently in bloom. Of the few Spurias I grow, I have experienced this only once before. I find it interesting that nearly 30% of the Spurias I planted are currently in bloom or pushing bloom stalks far too early for Spurias here in the Phoenix area. Apparently storing Spuria rhizomes in the refrigerator prior to planting them “fools” them into producing blooms the following spring. I welcome any

responses from Spuria members regarding their experiences of first year planted Spuria that bloom.

Soil Microbes

Submitted by Darol Jurn

"Soil Microbes" is intended to compliment a previous article entitled "Essential Plant Micro-Nutrients" that appeared in the Spuria News Winter 2008 edition. The following article on "Soil Microbes" was written by and is provided with the permission of Dr. David A. Zuberer from Texas A & M University.

Over the years in my position as a soil microbiologist at Texas A&M University working with beneficial soil microbes and teaching soil microbiology to a very diverse audience of students I have been approached by many people with countless questions regarding the nature of soil microbes and their normal functions in soils, both cropped and uncropped, including turfgrass soils. The questions have been as diverse as the audiences with whom I have had the pleasure of addressing. Nevertheless, certain questions seem to come up over and over again.

In this brief article I will pose some of these questions and try to answer them against the framework of what is currently known about the functions of microbes in soils and what factors govern their activities.

FAQ 1: What types of microbes are found in a typical field of turfgrass soil and how abundant are they?

Normal, fertile soils teem with soil microbes. In fact, there may be hundreds of millions to billions of microbes in a single gram [about 4 hundredths of a pound and about the size of a navy bean in volume) (See Table 1)].

Table 1: Numbers of Microbes in Soil

Microbial Group	Number/Gram of soil
Bacteria	100,000,000 - 1,000,000,000
Fungi	100,000 - 1,000,000
Algae and Cyanobacteria	1000 - 1,000,000
Protozoa	1000 - 100,000

*Sylvia, Fuhrmann, Hartel and Zuberer, 1997.

The most numerous microbes in soil are the bacteria (unicellular cells lacking a true nucleus) followed in decreasing numerical order by the actinomycetes (a specialized group of bacteria which contains many members that produce valuable antibiotics), the fungi (singular: fungus) which produce long, slender filaments nicely adapted for exploiting the three-dimensional pore network of the soil, soil algae and cyanobacteria ("blue-green "algae") (photosynthetic microbes which can add small amounts of carbon to soil and which also can be a nuisance in turfgrass golf greens) and soil protozoa (unicellular soil organisms that decompose organic materials as well as consume large numbers of bacteria).

Not only are the numbers of soil microbes generally very large, their combined mass (i.e. the soil microbial biomass) is also usually quite substantial. It can range from several hundred to thousands of pounds per acre of soil (Table 2).

Table 2: Microbial Biomass in typical fertile soils

Microbial Group	Wet Weight (lbs/acre)	Lbs/1000 per sq ft**
Bacteria	300 - 3,000	12
Actinomycetes	300 - 3,000	17
Fungi	500 - 5,000	35
Protozoa	50 - 200	8
Algae	10 - 1,500	3

** Data from Nelson, 1997b.

In addition to the microbes, there are numerous species of soil animals that inhabit soils. These include nematodes (microscopic roundworms which are generally beneficial but some of which are plant parasites of agricultural crops and turfgrasses), microarthropods (mites, springtails, etc.) and larger animals such as the earthworms, burrowing insects, etc. These larger organisms can exert beneficial effects through improved soil structure and improved aeration and drainage due to their channeling activities in the soil. Soil microbes are important for soil structure also but their effect is subtler. Soil microbes produce lots of gummy substances (polysaccharides, mucilages, etc.) that help to cement soil aggregates. This cement makes aggregates less likely to crumble when exposed to water. Fungal filaments, called hyphae, also stabilize soil structure because these threadlike structures ramify throughout the soil literally surrounding particles and aggregates like a hair net The fungi can be thought of as the "threads" of the soil fabric. It must be stressed that microbes generally exert little influence on changing the actual physical structure of the soil. That's the job of the larger "earthmovers".

Thus we see that a normal soil contains enormous numbers of microbes and substantial quantities of microbial biomass. This translates to an enormous

potential for microbial activity when soil conditions (available carbon sources, moisture, aeration, temperature, pH, and available inorganic nutrients such as nitrogen) are favorable. I stress potential for activity because under normal situations the microbial population as a whole does not receive a constant supply of readily available substrates to sustain prolonged high rates of growth.

FAQ 2: What beneficial processes do soil microbes carry out?

In addition to their role in cementing soil aggregates mentioned above, soil microbes are of paramount importance in cycling nutrients such as carbon (C), nitrogen (N), phosphorus (P), and sulfur (S). Not only do they control the forms of these elements [e.g. specialized soil bacteria convert ammonium N (NH4 +) to nitrate N (NO3 -)], they can regulate the quantities of N available to plants. This is especially critical in systems relying on organic fertilizers. **It is only through the actions of soil microbes that the nutrients in organic fertilizers are liberated for plants and used by other microbes.** Soil microbiologists call this process mineralization [the conversion of organic complexes of the elements to their inorganic forms, e.g., conversion of proteins to carbon dioxide (CO_2) ammonium (NH4 +) and sulfate ($SO4^{=}$)]. It is perhaps the single-most important function of soil microbes as it recycles nutrients tied up in organic materials back into forms usable by plants and other microbes. In fact, the so-called *Principle of Microbial Infallibility* (popularized by Dr. Martin Alexander of Cornell University) states that for every naturally occurring organic compound there is a microbe or enzyme system that can degrade it. Note that this applies to naturally occurring compounds. It is obvious that some our persistent pesticides did not conform to this principle and even some naturally occurring compounds are fairly resistant to microbial attack. It is through the process of mineralization that crop residues, grass clippings, leaves, organic wastes, etc., are decomposed and converted to forms useable for plant growth as well as converted to stable soil organic matter called **humus**. Herein lies another important role for the larger soil animals like earthworms. The large organisms function as **grinders** in that they reduce the particle size of organic residues making them more accessible and decomposable by the soil microbes. The soil microbial population also further decomposes the waste products of the larger animals. Thus, the activities of different groups of soil organisms are linked in complex "food webs". One beneficial process carried out exclusively by soil microbes is called **nitrogen fixation**, the capture of inert N_2 gas (dinitrogen) from the air for incorporation into the bodies of microbial cells. In one well-known form of this process, symbiotic nitrogen fixation, soil bacteria such as *Rhizobium* and *Bradyrhizobium* actually inhabit specialized structures on the roots of leguminous plants (soybeans, cowpeas, beans clovers, etc.) where they fix substantial quantities of nitrogen that becomes available to the host plant. Unfortunately, the root nodule system is not found in the grasses so we cannot rely on it for "free" nitrogen. Nevertheless, free-living (nonsymbiotic) nitrogen-fixing bacteria do associate with roots of grasses where they fix small quantities of nitrogen using carbon compounds (root exudates, sloughed root cells, etc.) produced from the roots as energy sources to drive the energy expensive nitrogen-fixing enzyme system. Another factor limiting the utility of free-living N_2 fixers is the fact that they will not fix N_2 when exposed to even very low levels of fertilizer nitrogen. Thus in fertile turfgrass soils this process is of limited importance whereas in unfertilized prairie soils the 10 to 25 pounds of N fixed per acre per year is ecologically relevant.

Another benefit of soil microbes is their ability to degrade pest control chemicals and other hazardous materials reaching the soil. Thus through the actions of the soil microflora, pesticides may be degraded or rendered nontoxic lowering their potential to cause environmental problems such as ground and surface water contamination. Of course, there is a "downside" to this microbial capability. In some instances, soil microbes have been shown to degrade soil-applied pesticides so rapidly as to reduce the ability of the chemicals to control the target pests. This phenomenon is known as **enhanced degradation** and usually results from repeated applications of a chemical to the soil. One way around this problem is to vary the use of pest control chemicals.

FAQ 3: What factors control the rates of growth and activities of soil microbes?

This is an excellent question because an understanding of what it takes to support the growth and activity of soil microbes enables one to make decisions about soil management. In general, microbes need what all living things need to prosper: air (oxygen), water, food and a suitable habitat to live in (Table 3)

Table 3. Principle environmental factors affecting soil microbes:

- Organic carbon - grass clippings, crop residues, organic wastes, etc.
- Moisture - 50-60% of water holding capacity

- Aeration - balance of air and water filled pores
- PH - near neutral (pH 6.0-8.0)
- Temperature - 10 - 40^{o}C
- Inorganic nutrients - adequate N, P, K, S etc., and trace metals

Interestingly, some soil bacteria (the anaerobes) do not even need air to grow and some are "poisoned" by exposure to oxygen. Generally, soil microbes grow best in soils of near neutral pH (7.0) having adequate supplies of inorganic nutrients (N and P, etc.), a balance of air- and water-filled **pore space** (about 50-60% of water holding capacity) and abundant organic substrates (carbon and energy sources). When any one of these parameter gets too far beyond the normal range some segment of the population will likely be stressed. For example, aerobic (oxygen requiring) bacteria will be at a disadvantage when a soil becomes waterlogged and available O_2 is depleted through respiration of roots, microbes and soil animals. Conversely, anaerobic organisms may predominate leading to unique problems such as the formation of "black layer" caused, at least in part, by the anaerobic sulfate-reducing bacteria. Similarly, if soils become too acidic (down to pH 4 or 5) bacteria and actinomycetes usually decline and fungi assume a more dominant position. Except at cool and warm temperature extremes, the soil microbial population is usually not severely stressed. Most soil microbes grow best at temperatures between 15-30^{o} Celsius (about 60 to 85^{o}F) and their growth rates increase with increasing temperature up to a point. This is why it is harder to maintain soil organic matter in warm climates. Interestingly, some cold-loving microbes (called **cryophiles)** can actually grow and cause disease under blankets of snow cover. Such is the case with the so-called snow molds which can damage turfgrasses extensively during winter months. The opposite extreme is found in **thermophilic** microbes ("heat lovers") that thrive in composts reaching temperatures as high as 65^{o}C (150^{o}F). It is the biological heating of composts that actually reduces levels of pathogenic microbes, weed seeds and insects during the composting process.

Without a doubt, **the most important limiting factor for microbial growth in soil (assuming moisture is adequate) is the abundance of available organic carbon sources**. The vast majority of soil microbes require organic carbon compounds (these are called organotrophs) to oxidize for energy and to build the organic constituents of their cell bodies. Only a few types of soil bacteria get their carbon from CO_2 (autotrophs) and they contribute little to the overall organic matter content of a soil with the possible exception of the cyanobacteria on the surface of closely mown turfs where they may accumulate as dark slippery films. Organic inputs in turfgrass soils come mainly from the grasses themselves in the form of root exudates, lysed root cells, decomposing roots and any clippings returned to the soil. Of course, organic amendments may contribute some useable carbon as well but bear in mind that amendments such as compost, which is essentially microbially decomposed organic materials, do not contain high levels of readily available carbon. Rather, they provide slowly useable substrates and contribute directly to the soil organic matter pool. Also, as a general "rule of thumb" about one third of the organic carbon added to temperate soils remains in the soil as humus and microbial biomass whereas about two thirds of this carbon is returned to the atmosphere as CO_2 through microbial respiration. The microbial decomposition of grass clippings is the basis of the "Don't Bag It" programs of lawn maintenance which rely heavily on mulching mowers and the subsequent decomposition of clippings in the soil.

FAQ 4: What can we do to increase microbial activity in the soil?

Frequently turf managers ask what can be done to increase microbial activity in soil. No doubt this stems from a desire to capitalize on the known benefits attributed to the soil microflora. This question can also be turned around on the person asking it, i.e., Why do you want to increase microbial activity? Another way of phrasing this issue is "Can there be too much of a good thing"? Remember, increasing microbial activity increases organic matter decomposition, which can be good or bad. It might also be clear at this point that FAQ's #2 and #3 bear strongly on this question. The short answer to this question is relatively straight forward. To increase microbial activity in a soil one must make the environment optimal, or at least more favorable, in terms of aeration, moisture, and pH, and above all provide the organic substrates needed to fuel the population. It has been known for more than a century that the abundance of microbes in soil is directly proportional to the organic matter content. Thus soils receiving large amounts of organic residues support a larger microbial population. Generally there is an explosion in microbial numbers following the addition of available substrates. However, as the substrates are consumed microbial tissues are formed and CO_2 is given off so there is a loss of carbon from the soil with some storage in microbial biomass. Microbial cells themselves become

food for other microbes and they too are decomposed through microbial activities. Eventually, microbial activity returns to a low level when substrates have been consumed or converted to compounds that are difficult to degrade that end up in the humus fraction. Thus we see that the increase in activity is transient. The normal state of affairs in soils not receiving large amounts of carbon on a regular basis is a microbial population subsisting on limited resources and metabolizing only very slowly. To effectively increase organic matter content in soil we must add more carbon than the microbes can decompose over a season. Regrettably, adding small amounts of organic materials like molasses to soils cannot do this. Soil microbes quickly use up substrates like these and little if any lasting effects are observed.

Another factor of great importance for decomposition of carbon in soil is the level of available nitrogen. When large amounts of available carbon are added to soils low in N, nitrogen becomes tied up, or **immobilized**, in the cells of the degraders. The net effect here is to induce nitrogen deficiency for plant growth due to swamping the system with available carbon. Careful attention should be paid to the **carbon to nitrogen** (C/N) ratio of organic materials added to soils for this reason.

Probably the most significant thing a turfgrass manger can do to sustain soil microbial populations is to maintain a vigorous, healthy turf. We know that grasslands are excellent microbial habitats and they can accumulate substantial microbial biomass. The same is true of well-managed turfgrass environments.

FAQ 5: Do organic fertilizers and other chemical inputs harm the soil microbe population?

Frequently we see statements in the lay literature about chemical fertilizers killing soil microbes or, worse yet, statements indicating these management inputs "sterilize" the soil. Statements such as these should be viewed with much skepticism! Remember that as we learned in FAQ #1, the soil can contain tons of microbes. Short of incineration its hard to imagine a stress in a soil that would lead to complete extermination of the microbial populations. It is true that some inputs, e.g., anhydrous ammonia, cause reductions in microbial numbers in the immediate vicinity of the application. After all, ammonia is a toxic gas. However, it quickly equilibrates with the soil solution in the form of ammonium ions and the toxicity subsides. Certain pesticides have been shown to cause similar transient reductions in selected microbial population. But remember, in some cases the microbes simply view these chemicals as food and degrade them fairly quickly.

Organic fertilizers circumvent the criticisms leveled at "synthetic" fertilizers but it should not be forgotten that plants take up nitrogen in the form of ammonium (NH_4^+) or nitrate (NO_3^-) ions regardless of whether it was mineralized from an organic source or applied as in inorganic fertilizer like ammonium nitrate. An advantage of using organics, where practical, is that nutrients are liberated slowly as the microbes mineralize the organic materials. Thus there is low risk for fertilizer burn on plants and less risk for environmental problems due to runoff and leaching. Another potentially negative effect of long-term use of ammonia-based fertilizers is soil acidification due to ammonia oxidation by the nitrifying bacteria. Soil pH can drop below 5.0 after prolonged use of ammonia-based fertilizers and this can cause marked reductions in populations of bacteria and actinomycetes and simultaneous increases in the relative abundance of fungi. Such changes might favor the development of certain fungal plant pathogens. On the other hand, the potato scab disease is reduced by the low pH because the actinomycete which causes it is eliminated. These changes are easily reversed with applications of lime to the soil. Thus we see qualitative changes in the soil populations due to some management inputs but this is a long way from "sterilizing" or "killing" the soil.

With the advent of high-sand golf greens questions have arisen about the need for applying microbes during green construction and thereafter. Sand because of its lack of organic matter supports little microbial growth. However, when mixed with peats, composted rice hulls or other organic amendments it gains the microbial populations associated with those materials. Turfgrasses established from vegetative sprigs also bring their root-associated microbes with them! Once the turfgrass begins growing in the rooting medium of the green, microbes already present will colonize roots and the mechanics of soil organic matter formation will commence. A reasonable practice would be to add a small amount of normal pathogen-free soil to the greens mix as an inoculum. Thus far, there is little scientific evidence indicating the need to inoculate golf greens with selected microorganisms. The newly constructed green does afford us the possibility of customizing the soil population to some extent. Once we know what we want in these mixes it may be easier to add them "up front" than to add them into an established population already adapted to the prevailing conditions of a particular soil. As our knowledge of soil microbial biodiversity and the factors that

control it increases we may find ways of tailoring microbial populations in given environments. At this point, we are limited in what we can do to this effect.

FAQ 6: Why are biological products more variable in producing desired results?

Considerable research has been done on applying various microbes as inoculants for various purposes including their use as agents to control plant diseases, (including turfgrass pathogens; Nelson, 1997a), to stimulate plant growth (the socalled plant-growth-promoting rhizobacteria; PGPR) and more recently their use in various forms of bioremediation processes. Perhaps the most outstanding example of beneficial use of a soil bacterium is the practice of inoculating legumes with bacteria such as *Rhizobium* and *Bradyrhizobium*. Some crops are nearly self-sufficient in meeting their nitrogen requirements through this process. The process is so successful because the plant essentially selects the bacterium and builds a habitat, the root nodule, where conditions for nitrogen fixation are optimized. However, even with this remarkable symbiosis there are failures for one reason or another. Thus one of the nagging problems of using organisms as inoculants is the tendency for erratic control of pests or failure to observe any benefit from inoculation. Reasons for inconsistencies in response to inoculation can be manifold. What are some biological reasons for the failure of these types of products? There are many reasons why introduced bacteria do not become established when added to the soil in very low numbers. Some biological factors are listed below.

Some biotic factors responsible for the elimination of introduced microbes:

- Microbially produced toxins
- Predatory protozoa
- Lysis by bacteriophage (bacterial viruses)
- Lysis by Bdellovibrio bacteriovorus
- Lysis by microbial enzymes
- Inability of introduced microbe to compete

Here we see a number of problems that an introduced microbe must overcome in order to establish itself among the normal population. These include inhibition by toxins, predation by other soil microbes such as the protozoa and a bacterium called *Bdellovibrio*, lysis by viruses called bacteriophages, and a simple inability to compete with the native organisms.

Compounding our problems with introducing microbes to the soil is the fact that soil environmental factors often contribute to the demise of added cells. For example high or low soil pH, toxic concentrations of metals, extreme temperatures, etc., can cause failures in establishment of introduced microbes.

Some abiotic factors responsible for the elimination of introduced microbes:

- High or low pH
- High concentrations of Mn, Al, etc.
- Extreme heat or cold
- Many others

It is well to recall that each soil has an indigenous microbial population that is selected by the prevailing biotic and abiotic factors unique to that soil. Typically it is difficult to add or displace microorganisms to or from a system in such an equilibrium. An axiom of microbial ecology often referred to as Beijerinck's Rule (Beijerinck was a Dutch microbiologist who is often considered the "Father" of microbial ecology) states that "Everything (microbes) is everywhere and the milieu (i.e. the environment) selects". Thus each soil is endowed with a stable community of microbes uniquely selected by and adapted to the prevailing physical, chemical, and biological conditions of that soil. Minor perturbations have little effect on this balance.

From the above discussion, one can see that there are many factors, both biotic and abiotic, that can come together to foil our attempts to use beneficial microbes in practical applications. It is because of these inconsistencies that biological alternatives are often met with reluctance by users. There is a greater comfort factor in using a chemical formulation that delivers more consistent results when applied as directed. However, as research progresses and we gain a clearer understanding of the characteristics that make an organisms successful in the soil or rhizosphere environment it is likely that we will see the development of useful microbial products for a number of purposes including increasing plant growth, protecting crops from disease, organisms for use in bioremediation or for enhancing the cleanup of pesticides in rinsates etc. However, one thing will be reasonably certain, those that come to the forefront will be **based on sound biological principles and will be backed up by substantial research demonstrating the efficacy of the product in meeting the claims of the manufacturer**. In the meantime a few pointers for testing new products should be considered (see below). Testing new products is an expensive proposition. However, without well-designed, replicated field trials useful information about the effectiveness of a product cannot be developed. After all, the proof is in the performance of the

product under normal user conditions whether it be for turfgrass management, agricultural production or some other specific application. Microbes can and do indeed accomplish wonderful things. However, our abilities to harness and successfully manipulate beneficial microbes remains a "work in progress".

Testing Microbial Fertilizers and Soil Activators (Biostimulants)

- Testimonials should be viewed with skepticism. Ask to see original data.
- Test products in replicated plots with valid statistical designs
- Test products across multiple soil types
- Test products across locations, climate, etc.
- Minimally: test product in strips in fields and measure yields, turf performance, etc.

Suggested readings:

- Alexander, M. 1977. Introduction to Soil Microbiology, 2nd. Ed. Krieger Publ. Co., Melbourne, FL.
- Christensen, P.D. 1977. Soil Medicines. Bull. EC378. Coop. Extension Service, Utah State University, Logan Utah.
- Nelson, E.B., 1997a. Biological control of turfgrass diseases. Golf Course Management. July, 1997.
- Nelson, E.B. 1997b., Microbiology of turfgrass soils. Grounds Maintenance. March, 1997.
- Sylvia, D., J. Fuhrmann, P. Hartel and D. Zuberer. 1997. Principles and applications of soil microbiology. Prentice Hall Publ., Upper Saddle River, N.J.
- Turco, R., 1992. Soil Microbiology. Golf Course Management. March, 1992.
- This paper was first presented at the 1999 Annual Meeting of the North Carolina Turfgrass Council in Charlotte, NC. It appeared in the publication distributed by the NCTC.

Spurias in Mississippi

By Kevin Vaughn

One does not usually think of the steamy Southeast USA as a prime site for Spurias and it was not until I saw old (probably 20 years + old based upon comments from the garden owner) of I. Ochroleuca that I thought of trying them here. Knowing that this species was the base of the Nies spuria hybrids, I sent an order off to Joe Ghio for the then new Corlew introductions 'Offering' (creamy quince) and 'Flint Ridge' (orange yellow) plus his near black 'Lucky Devil' to give them a try in my garden. All bloomed beautifully the next spring and of course I just had to cross them. Nothing with pollen is safe in my yard and the Spurias looked mighty tempting. The form of 'Offering' was especially appealing to me, having rather short-shanked falls giving a compact form and tight ruffling. It reminded me of the Siberian White Swirl and that flower certainly revolutionized shape in that group. So the crosses made were 'Offering' X 'Flint Ridge' and 'Offering' X 'Lucky Devil', with the goal of producing a range of flowers with the Offering form.

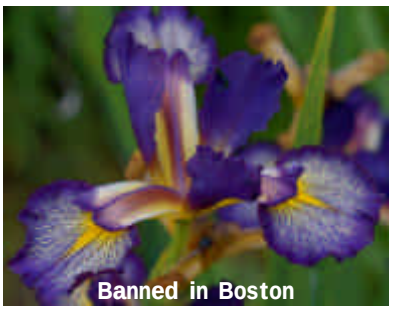
Two years later the seedlings bloomed and all of them were very nice. The 'Offering' X 'Flint Ridge' group ranged from the creamy yellow of 'Offering' to the almost orange yellow of 'Flint Ridge' but also yellow amoenas and some bright clear yellows. Best yet they all had the lovely Offering form. The 'Offering' X 'Lucky Devil' group were all purples of various shades, none quite as dark as 'Lucky Devil', but close. Instead of self colors, though, almost all of these had a pattern of purple veins on a cream to white ground color. My favorite was one where the falls were neatly banded a deep purple on a near white background. Its form was very much like 'Offering' but the flower was about half again as big. My knowledge of spurias was so little at that point I decided to purchase a more substantial collection so I could determine if what I had created was worthy of naming and also to broaden the gene pool.

About 25 cultivars were purchased and nearly all bloomed beautifully the next year. The new cultivars were intercrossed and crossed to the group of 'Offering' seedlings. About 3,000 seed resulted from those crosses and almost 2,000 seedlings germinated and were rowed out. Then a reality of Spuria culture in the South, mustard seed fungus, hit. About August, the spring-planted seedlings started dropping one by one. This was especially odd in that the bed of Spuria cultivars was only 20' away and not a single plant was affected nor were any of the first seedlings from the 'Offering' group. That bed became a daylily very quickly! Since then I have used Terrachlor treatments in all my Spuria plantings and the mortality is almost nil now. Amazingly enough 5 plants survived the mustard seed fungus onslaught and two were seedlings from the original 'Offering' crosses. A bright orange yellow from 'Sentra' X ('Offering' x 'Flint Ridge') is my favorite of that class right now. It is a much larger flower than 'Offering' but with the compact form. It makes a great clump and the blooms are very well spaced. The vigor of this plant is impressive, with 5-9 increases/ fan/ year. From 'Chica de Sonora' X ('Offering' X 'Lucky Devil') came a very unusually colored flower. A very compact flower of an almost teal blue, with a shot of iridescence on the falls, giving it sort of a peacock flash look. My only complaint with this flower is a bit

of inconsistency. Some years, like in '08, it is an amazing flower but in other years less so. This year I finally started using it in a serious way as there really is no other spuria this color that I have seen. 'Chica de Sonora', its maternal parent, bloomed out in its first year here so I crossed on it heavily, hoping that keeping the stalk green longer would keep it living. Unfortunately it didn't. It is a lovely flower and I'd like to get another for breeding if any of you have it. Yet another was one of my attempts for a "pink" spuria from crossing 'Highline Coral' X 'First Fruits', a sort of white all-over veined pinkish lavender giving a pink effect but pink it ain't. Dave Niswonger has nothing to worry from my competition in this area, although this flower has a different look than the Niswonger pinks. I made a few crosses with it in '07 and I should see some of the progeny this spring.

The most exciting of the survivors though was one from 'Highline Snowflake' X 'Touch of Lace'. When 'Highline Snowflake' had its maiden bloom I thought it was the most beautiful spuria I had ever seen. The tight ruffling and compact form were amazing. 'Touch of Lace' has some of the ruffling but a much more typical Spuria form, not at all compact, but the flowers had delicate small ruffles. Both 'Highline Snowflake' and 'Touch of Lace' are nice vigorous plants, which is something I think we need, as some of the spurias are especially slow to increase. The one survivor from this mating was amazing and every garden visitor has dubbed it as "the most beautiful spuria I have ever seen". The form of the flower is very short-shanked and the ruffling is the most I've seen on any spuria. The flowers open very nicely with no crowding. This is a shorter Spuria that should be good for facing down the bigger ones. Last year I registered it as 'Angel's Smile' and began crossing it to every other color. Wouldn't you like a yard of spurias with that form in all the colors?

My spuria program was greatly served by buying the house and property next door. Although I live in the Delta of MS, where the only change from a flat perspective is the curvature of the Earth and the occasional ditch, the yard next door was 3' higher than mine, due to the dredgings of the local creek being deposited on it in the late 50's. So besides being higher it has incredibly fertile, silty soil. The landscaper that rototilled the beds for me described it as "rototilling potting soil". (I think this is payback for growing up in New England, where I had a veneer of topsoil!) The 3' higher yard made sure that the moisture did not sit. One of my problems in my own yard was that when you have a 6" rain you have 6" of water everywhere. Spurias do not like that. When I put the first bed of new Spurias in the new yard, the plants just exploded and several rows of seedlings quickly made clumps. By then I had sort of narrowed my Spuria breeding focus. One effort was to make more compact plants like 'Highline Snowflake' and 'Mini Trend'. Although there are a number of quality large spurias, there are surprisingly few under 30" in height. A second and perhaps related goal was to get the compact flower form of 'Offering' and 'Highline Snowflake' into other colors. The last goal was to improve the darker Spuria colors, especially using the 'Offering' X 'Lucky Devil' seedling now registered as 'Banned in Boston'.


Banned in Boston

One of the smallest Spurias I grow is 'Maritima Gem' of Hager's. It has a striking blue color and a stalk that rarely reaches 24" in my yard. I have never had luck setting seed on this plant but the pollen appears mostly normal under the light microscope and it set seed on 'Mini Trend', a blue but one not nearly as small as Maritima Gem. Two seedlings resulted from the cross. One is sort of a smaller, bluer version of 'Mini Trend' with a little better shape. It is a very vigorous plant and has made a nice clump already. The sib is a very strange plant, with foliage no more than 5" tall. The plant has increased but has of yet not bloomed. Considering the mixed ploidy level likely in this plant, groups of chromosomes may have been lost leading to some severe plant defects. A better effort in terms of numbers was a cross of 'Mini Trend' X 'Highline Snowflake'. All of these were blues of some shade, one being an odd clear flower of a very pale blue, nearly white and with no signal. Size on these was excellent although none had the tight ruffling of 'Highline Snowflake'. Both sib and backcrosses to Highline Snowflakes were consummated to try and combine the blue color, small size and ruffled form in one flower.

After the initial successes with 'Highline Snowflake' in passing on good form, I used it on a number of other flowers. This tends to be a Vaughn plan in crossing, taking a single outstanding cultivar to the yard, instilling these good characters into a number of other lines. Most of these should bloom next season but the ones that bloomed in '08 were quite amazing. My favorite was a small fluted white from 'Ila Remembered' X 'Highline Snowflake'. As those of you who grow 'Ila Remembered' know, the flower has a wide ruffled or fluted form (unlike the tight ruffles in 'Highline Snowflake') and very wide blossom

parts. This seedling has the wide parts of 'Ila Remembered' and now the fluting reduced to a fine fluting and the whole flower compact. This flower also has very little signal despite the bold signals on both 'Ila Remembered' and 'Highline Snowflake'. There are almost 150 more from this cross to bloom next year and the plants range from large and wide leaved to grassy, narrow and small. Needless to say I'm very interested in this group. After seeing what 'Offering' did in the 'Lucky Devil' and 'Flint Ridge' crosses I took all the flowers from a 5' clump of 'Offering' and crossed it to all colors and patterns. Both 'Offering' and 'Highline Snowflake' should really refine form in the spurias.

'Banned in Boston' has a nice combination of pattern, color and form and it also is unrelated to a lot of the other dark spurias, many of whom are seedlings of the slow-growing 'Crow Wing'. Pauline Evan's 'Sidonie' impressed me as a very good grower and with a bit different pedigree too. A cross of the teal seedling from 'Banned in Boston' with 'Sidonie' gave a whole row of very nice purples and surprisingly almost all were most completely selfs rather than carrying the fall pattern of either 'Banned in Boston' or 'Sidonie'. As the cross bloomed, I started numbering the nice ones and ended up keeping the whole row as they were all nice flowers with lots of buds and good color fastness. Unfortunately none had the teal color either, but I did sib and backcross these to the teal. I also took 'Banned in Boston' to a number of my other favorite dark Spurias such as 'Midnight Rival' (great size and vigor), 'Stars at Night' (nearly black) and to the Blyth dark ones such as 'Thunder Run' and 'Theatergoer', both of which have nice form as well. These crosses all made good quantities of seed.

One of my "what if" crosses was 'Ila Remembered' X 'Adriatic Blue'. 'Adriatic Blue' is a bit of a reluctant parent, not surprising because of it being descended from the F1 species hybrid 'Russian Blue'. As the seeds began to germinate, one seedling was different. It had very wide foliage and was more vigorous than its siblings right from the start. Because of its size I rowed it out separately from its sibs. It bloomed one year from rowing out and had 8 good-sized fans in addition to the blooming fan. And the flower..... a really great combination of the two flowers. If you can imagine a wider, fluted, larger, bluer version of 'Adriatic Blue' then you are close. The flowers displayed themselves beautifully on the stalk as well. Pollen was rather scant on this plant and no pods set but I'm hopeful to get some seed from it next season. Also there are a number of other seedlings from this cross to bloom that I made the cross in subsequent years so another 50 or so from this mating should bloom in '09 or '10.

I find the Spurias fascinating subjects and wonderful plants. I think they have been a well kept secret and we certainly need to keep the secret no longer.

Spuria Popularity Poll

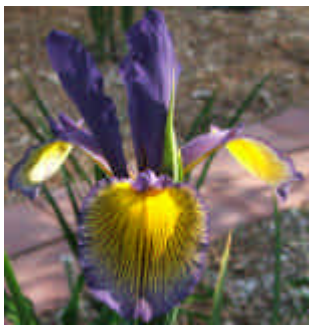
It is time to vote for your favorite Spuria. You're participation in this poll is greatly appreciated. Please vote for your favorite Spuria and return to Keith Smith **NO LATER THAN** March 31, 2009:

1. _____
2. _____
3. _____
4. _____
5. _____
6, _____
7. _____
8. _____
9. _____
10. _____

Mail this ballot or just e-mail your choices to:

Keith Smith
6008 Wonder Drive
Fort Worth, TX 76133-3623

E-mail: *masfw@flash.net*



Sonoran Nightfall
Wickenkamp - 2004
Photo by Iris Howse

Lighted Signal
B. C. Jenkins - 1991
Photo by D Jurn

2009 Spuria Introductions

'Chocolate Rosette' - (O. D. Niswonger by M. & J. Wilhoit, R. 2007) Sdlg. WN-2 SPU, 34" (86cm) ML. Standards are light charcoal brown, yellow gold infusion at base and up midrib; style arms charcoal brown edged yellow brown, chocolate brown tips; Falls chocolate brown, large diffused yellow gold signal patch. Parentage unknown. Available at Redbud Lane Iris Garden.

'Say It's Pink' - (L. Walker - 2009) Spuria 39" M. Standards have a yellow center with lavender pink edges, falls are light gray overlaid lavender pink, styles have a pink center and tip with a cream edge, signal is dark yellow in the center with a lighter yellow edge and pink veins, slight spicy fragrance. Available at Wildwood Gardens

'Blood Of Eden' - (Jim Hedgecock - 2009) Sdlg L-9-B-SPU, 32", ML. Finally Jim has some supria intors this year. Blood oOf Eden has been a favorite of Jim's for several years. The ruffled standards are mahogany red-black. The falls a flaring and ruffled mahogany red-black with a small burnt gold signal and sun rays covering the upper 1/4 of the falls. Slight mild fragrance. Good stalks with a Midwest bud count of 4. Parentage: 'Bordertown' x Unknown. Available at Comanche Acres.

'Mythical Nights' - (Jim Hedgecock - 2009) Sdlg CL-57-M-SPU, 23" ML. Rampant growth is a standard for this new spuria. The upright ruffled standards are dark navy blue-purple. The falls are also dark navy blue-purple with a small dark yellow signal surrounded by red-black striations on the upper 1/3 of the falls. Superb form with a Midwest bud count of 4. This one will be popular. Parentage: 'Port Of Call' x 'Stella Irene'. Available at Comanche Acres.

'Piper May' - (B. C. Jenkins by Jim Hedgecock - 2009), Sdlg CJM-59-B-SPU, 32", ML. Charlie wanted to name this one after his great grand daughter, Piper May. The ruffled standards are reddish purple with slight yellow infusions at the midribs. The falls are ruffled and fluted bright yellow with stitches and striations of reddish purple covering the lower 2.3 of the falls. We are using this one for dark top seedlings. Excellent stalks with a western bud count of 4 to 5. Parentage: C-24-75: (('Pang' x 'Crow Wing') x Open) x 'Proud Moment'). Available at Comanche Acres.

'Walk the Line' - (Jim Hedgecock - 2009) Sdlg CM-3-A-SPU, 38", EM. The ruffled standards are dark purple blue. The ruffled falls are dark purple blue with a small medium yellow signal radiating out to white and yellow lines that cover the upper 2/3 of the falls. Wonderful stalks with a Midwest bud count of 6 or more. Parentage: 'Bordertown' x 90M124A (from Corcea Seeds). Available at Comanche Acres.

Commercial Sources for Spuria Iris

Aitken's Salmon Creek Gardens
608 NW 119th Street
Vancouver, WA 98685-3802
Phone: (360) 573-4472
Fax: (360) 576-7012
E-mail: *aitken@flowerfantasy.net*
Web site: *www.flowerfantasy.net*

Cadd's Beehive Iris Garden

329 North St
Healdsburg, CA 95448-4209
Phone: (707) 433-8633
E-mail: *caddsiris@comcast.net*

Comanche Acres Iris Gardens

12421 S.E. State Rt. 116
Gower, MO 64454-8613
Phone: (816) 424-6436
Fax: (816) 424-3836
Toll free: (800) 382-4747 (orders only)
E-mail: *jim@comancheacresiris.com*
Web site: *www.comancheacresiris.com*

Iris Gallery / All Things Iris
33450 Little Valley Road
Fort Bragg, CA 95437-9544
Phone: (707) 964-7971
Fax: (707) 964-4890
Toll Free: (800) 757-4747 (IRIS)
E-mail: *irishud@earthlink.net*
Web site: *www.allthingsiris.com*

Iris Howse and Gardens
3915 Vista San Miguel
Bonita, CA 91902
Phone: (619) 479-3887
E-mail: *irishowseandgardens@cox.net*
Web site: *www.irishowseandgardens.com*

Kary Iris Garden
6201 East Calle Rosa
Scottsdale, AZ 85251-4224
Phone: (480) 949-0253
E-mail: *ardikary@aol.com*

Quail Hill Gardens
2460 Compton Bridge Road
Inman, SC 29349-8489
Phone: (864) 472-3339

Redbud Lane Iris Garden
2282 N. 350th St
Kansas, IL 61933-6087
Phone: (217) 948-5478
E-mail: *redbud@cell1net.net*

Scott's Iris Gardens
14605 Chispa Rd.
Atascadero, CA 93422-6517
Phone: (805) 461-3270
Fax: (805) 461-5670
E-mail: *scottsiris@sbcglobal.net*
Web site: *www.scottsirisgardens.com*

Wildwood Gardens
P.O. Box 250
Molalla, OR 97038-0250
E-mail: *gardens@molalla.net*
Web site: *www.wildwoodgardens.net*

If you have a commercial garden that sells Spuria and would like it listed here, please contact the Spuria News Editor, Darol Jurn at *djurn@prodigy.net* or (623) 932-3412.

Calling all Hybridizers!!! Include your Spuria introductions in the Spuria Slide Show. Send a slide of your newest introduction or even older cultivar to:

Riley Probst
2701 Fine Ave.
Modesto, CA 95355

Your slide must have the name of the cultivar, hybridizer and year introduced written on the slide. The slides will become the permanent property of the Spuria Iris Society.

For articles or information requested to be printed in the Spuria News, please submit the information to the Editor, Darol Jurn (djurn@prodigy.net) by the publication deadlines:

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