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AT FIELD’S END
THE PICTURES AND POETRY OF PLANT DISEASE

CROP PROTECTION NETWORK
AT FIELD’S END
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**DISCLAIMER**

Any lesions, pustules, spores, galls, or abnormal growths that appear similar to real persons is coincidental.
Dearest Reader,

As you have likely discovered in your own endeavors, verse and plant disease have long been at odds with one another. It is a fact of scientific thought that where phytopathology goes, rhyme does not. Until publication of this text, plant pathology acted as a parasite upon the goodwill of the written language. Indeed, lingo languished and dialects were dying as plant disease undid vernacular variance with vehement violence. Now, however, verbs, nouns, and adjectives join with conjunctions and team up with run-on sentences to welcome lesions, sclerotia, hyphae, and ascospores to form a symbiotic assemblage of astounding articulations, subtle sayings, and mediocre mutterings. Poetry and phytopathology merged and were mixed, subjected to the pipetter of destiny, and laid upon the agar plate of fate. And this book is what has grown upon that little plate.

As my beloved grandfather was ever uttering “Stop yammerin’ Barty!,” we must be moving along as well. But I have found that a little alliteration allows us to amply alleviate any awful assumptions one has when embarking upon a new book. Thus, It is with great gratitude that Edward Sikora and I grandly greet you to this garrulous guide with gusto!

With Dearest Regards,

Sebastian E. Bartholomew
Phytopoet Extraordinaire
Chief Word Officer (CWO) at Xylem, Phylum, Hilum LLC.
Origin of the Plant Disease Triangle

Robigus reigned over wheat fields in Rome, but Caesar should have left red dogs alone. We know something the ancients did not, For they operated using only the plant disease dot!

This sturdy dot was in vogue for a time Until science brought forth the plant disease line. An advancement prepared by scholars of yore When they found out that disease dots are a bore.

The line could be used to show all the facts, All the spore needs is a plant to attack! But wait, when it’s dry, the disease says goodbye And then the sublime line was no longer fine and Thrown into the compost heap of time.

Plant disease exploration was stifled, was still, Was nearing extinction and heading downhill. The pipettors had stopped, the microscopes covered, Plant disease labs were all being shuttered…

…when a rebel, a hero, an unorthodox student Spoke up when silence was no longer prudent This scholar had spent many hours in thought And after long labor the brain child begot: “Let’s look at disease from a new and strange angle!” And that was the birth of the plant disease triangle. The equation was changed, lab stools overturned This concept was hot like a good Bunsen burn.

Adding weather to concepts of spore and plant host Was messy like butter on both sides of your toast. But it took the obscure and cleared up conundrums And attracted grant funds by the tens and hundreds. The disease triangle was a new-fangled angle That deftly unraveled long standing tangles. The triumvirate troop of spore, plant, and weather Was insightful and genius and impeccably clever.

But wait! APS (the Arctic Phytopathology Soc.) Has three new PhDs all lined up to talk On a four-sided beast of a plant disease square, And the thought of this travesty loosens my hair…

Diseases of corn multiple species
Oasis of Kudzu

Like a lamp in the dark or a spring when it’s dry,
So the kudzu appears to the spore as it flies.
It’s tired and windswept and ready to rest, and
Maybe eat some of the plant it loves best.
*Phakopsora* sighs as it settles on leaves,
After it’s ride on the blustery breeze.

The appresorial peg will makes plants beg
To be spared from this rusty trial.
But let’s be candid, if the spores have landed
You’ll have hyphae in a short while.
Stomatal gates are the usual place
Where leaves are prone to failure.
But this rusty spore sailor cuts cell walls like a tailor.
Now with moisture and heat and a bit of time,
Many more spores soar towards northern climes.

Riding a hurricane across the equator,
Sentinel plots kept rust on the radar
While chem companies fomented formulations
For emergency fungicide crop applications.

So if you’re headed south,
Punch ol’ rust in the mouth,
Saying “Give those soybeans a break.
But since your pusty old spores
Have come to these shores,
You can have all the kudzu you can take.”
Kudzu Commander

After working for many years in and around kudzu, Ed Sikora, a plant pathologist working in Alabama, developed the ability to control this audacious plant using only raw willpower.

The ruin in this image was a brand new apartment building prior to the Kudzu Commander’s dictate to the kudzu to “Bust it up, brick by brick.”

There are consequences for those who choose to build on the Kudzu Commander’s favorite fishing spot.
Flock of Mohawks

When the sky grows dark and the soil is wet, 
*S. macrospora* casts its net.  
With a flagellum whip of a tail  
Using submerged soil to sail  
To unsuspecting and innocent corn  
Who once infected is treated with scorn  
By the other hybrids who laugh and look down  
On the runty, stumpy plant near the ground.

Thin strappy leaves and short internodes,  
Leave corn ugly like a grandpappy toad.  
Crazy top creates upside down mops,  
Cursing the field with a flock of mohawks.  
Turning tassels to terrible twirls  
And garrulous growths of gross green swirls.

Likely observed on the edge by the road  
In lowly spots where water has flowed.  
Drain the zoospore vacation pool  
To keep corn from looking like a pompadoured fool.
Ode to a Grain Bin

Thou still unfilled cylinder of grain storage,
Thou auger-fed and fall-filled kernel container!
Seasonal historian, who canst thus express
A grainy tale more dusty in its time?

What steal-fringed rivets haunt about thy shape
Of corn or soybean or of both?
On farm or at the edge of rented land?
What propane flame does dry the moisture in thy grain?

What rows of stalks are these? What grain carts pull?
Harvested yields are sweet
But those yet harvested are sweeter.
Therefore, ye grain bin fill on to field’s end.
Never Seen Again...

This is what happens when you park in Ed Sikora’s spot in the lot. Shortly after this image was taken, the tendrils of kudzu pulled this pick-up truck into a pond and it was never seen again.
Target spot of soybean
*Corynespora cassiicola*
Rotty ‘Gillus: A Haiku

Aspergillus rot
Green mold and aflatoxins
Vestige of an ear

Aspergillus ear rot of corn
Aspergillus flavus
Soybean Killa

When little gray eyes with red mascara
Peep from the beans you must beware-a.
I despise frog eyes on soybean tri’s
For the petioles triplets are troubled.
Photosynthesis fails when lesions prevail
If _Cercospora_ tells it’s sad tale.

A non-host crop can help put a stop
To the rampaging craze of sporezilla.
Fungicide used in a way that is wise
Blinds the eyes of this soybean killa.
But if fungicide fails, frogeye will prevail
And _Cercospora_ makes _Glycine_ wail.

_Frogeye leaf spot of soybean_
_Cercospora sojina_
A Town’s Insolence

The town in the background of this image had the insolence of running out of canned spray cheese when Ed was hungry after a day of crop scouting. The Kudzu Commander is not to be disappointed.
Kudzu Eats Everything
Southern Rust of Corn

The terror stalks through southern fields,
It siphons hope and steals yields.
The pustules eruptules and polysora soars,
It takes to flight on windy nights
And floats to Midwest shores.

Urediniospores fall from the sky,
And hybrid leaves begin to die.
Famished kernels yearn for fill,
When southern rust closes to kill.

The combine cries, the chaff spreader chafes,
The auger slows, the bins don’t break.
When pustules eruptules and polysora soars,
It takes the strength of mighty men and shakes me to the core.
The Kudzu Commander’s Bride

aka The Southern Soybean Queen
Northern corn leaf blight
Setosphaeria turcica
Dead Man’s Fingers

I laugh at Xylaria because it’s hilaria,
Unless it is found in bean rows.
When it’s rainy and humid and still as a tomb-bed,
After a canopy closed.

Soybeans stay loyal to Bama’s red soil
As long as roots stay intact.
But they start to whine if taproots decline
Fungi make them feel out of whack.

Inoculum sticks like glue to old residue,
The fingers of dead men are seen.
Rotate and till to keep those fingers still,
Or plant less-susceptible beans.
The Spore Went Out on a Windy Night

The spore went out on a windy night,
It prayed for the breeze to give it flight,
For it many a mile to go that night
Before it reached the field-o, field-o, field-o,
Many a mile to go that night before it reached the field-o.

Farmer John went to the top of the bin
And saw his field the spores were in
“Next year I’ll plant resistant seed
When I drive through this field-o, field-o, field-o”
“Next year I’ll plant resistant seed when I drive through this field-o.”

It flew till it came to a great big land
Where the corn and soybean grew therein,
Said “I’m gonna grow mycelium
Before I leave this field-o, field-o, field-o,”
“I’m gonna grow mycelium before I leave this field-o.”

The spore continued to grow and spread,
On disease cycle eight, nine, and ten
It took to the wind to spread again
To plenty of mighty fine field-o’s, field-o’s, field-o’s,
It took to the wind to spread again to plenty of mighty fine field-o’s.

It landed on a great big leaf
With appressoria began to feast
It didn’t mind the chitinase
And the fungicide in the field-o, field-o, field-o,
It didn’t mind the chitinase and fungicide in the field-o.

The spore and his friends without any strife
Flew to a field that very night.
They never had such leaves in their life
And the little spores lived in the residue, residue, residue,
They never had such leaves in their life and the little spores lived in the residue.

Old crop scout jumped outta the truck
Went to the field to take a look,
Calling, “Farmer John, the yield is gone
Fungi are in the field-o, field-o, field-o,”
“Farmer John, the yield is gone fungi are in the field-o.”

Common rust of corn
Puccinia sorghi
The Petiole’s New Clothes: A Haiku

Sudden death syndrome
Leaves fall, petioles remain
Plant resistant beans
Kud-Zoo

Zookeepers learned the hard way to always let Ed, the Kudzu Commander, feed the elephant and giraffe when he asks to do so. Henceforth, this animal containment facility was known as the “kud-zoo.”
I’ve trained my cat to hunt corn ‘shrooms
That grow from ears like floral blooms.
If it smells a single teliospore,
It won’t stop hunting ‘till it finds more.

Like a pig towards a truffle, it will shuffle
To the sought after fungal delight.
This cat’s tail curls up like a snail,
And it’s whiskers may even ignite.

Galls look like corn ice cream cones,
Covered in chocolate drizzle.
Those maize mushrooms will soon be mine,
Can you hear them sizzle?

There are those who are not impressed
By bulbous kernel growths.
They hope their fields will bring corn yields,
Not fungal spreads for toast.

If you’re not a fan of delicious galls,
There are a few things you can do:
Avoid injury and plant resistant seeds
And my smutty cat won’t bother you.
Real Crop Scouts Ride Dinosaurs

Some crop scouts walk, some ride a quad.
But I've a different way to cover the clods:
I ride on the back of a real dinosaur,
Purchased for cheap off the dealer's show floor.

We bonded real quick when I picked up a stick
And tossed it off into a ditch.
Rex follows me close if I carry rump roast
No need for a trailer or hitch.

He doesn't need gas or a battery charge
A dino gets what he needs from the landscape at large.
He can't walk on the roads, 'cuz if he unloads
It takes a skid loader to clean it.

When riding high on my T-Rex scout,
I'm quite capable of looking about
And seeing a field from this side to that,
I can spot where yellow patches are at.

Is it a nutrient lack or a ravenous pack
Of spidermites stippling the leaves?
Could be IDC or something yucky
Like a slimy bacterial disease.

In my custom saddle on top of ol' Rex,
It's rather high from the dirt.
But this big lizards trained, at the sound of his name,
He gently leans toward the earth.

I grab a scope and climb down a rope
To get a close view of the plants.
Then with a nod, I'm lifted off of the sod
And gently set upon T's back.

I've a neat apparatus for checking soil status
For nitrogen or nematodes.
In the spot that needs checkin' I toss a whole chicken,
And Rex bites a great big load.

He's not exact and so he brings back
A good deal of dirt with the feathers.
Then at the truck, I floss out the muck
From his teeth for a good soil sample.

Kernels collapse, beans may bust,
When each gigantic foot is thrust.
Stalks are crumpled, stems are rumpled
But there's only one transport I can trust.

So if you’re in need of a scout and you won’t pout
‘Bout some trampled crops or compaction,
Please don’t stall and give me a call,
I’ll get ol’ Rex into action.

Scout riding a dinosaur
Kudzusaurus rex
Knotty Nematodes

Knotty, knotty nematodes
Nibbling on poor soybean’s toes.
Northern, southern, Javanese _Melo-ido-gyne_ these.
Don’t forget the peanut ‘tode
Reducing legume butter loads.

Severe in sand, weeds lend a hand
Rotation may not go as planned.
When it’s dry, roots will cry
As RKN makes them die.

Leaves turn yellow, plants don’t grow
If there are galls how can one know?
Sample soil when crops are out
Find a lab to make a count.
Knotty, knotty nematode
Nibbling on poor soybeans toes.

_ROOT knot nematodes in soybean_ _Meloidogyne spp._
Ed, the Kudzu Commander, at his secret training grounds where he is teaching his children the art of being a “kudzu whisperer.”
Feeling Downy and Dewey

Beans may feel downy, after some dewey
If they have caught a case of the vegetable fluey.
Light green spots indicate disease
And look like jumpless neon fleas.

All covered in spots like bad chicken pox
With no calamine lotion to spread.
Sporangiophores grow through stomatal pores
And plant cells will soon be dead.

If mornings are wet and leaves haven’t dried yet
Some spores may grow from this bean rash.
Look under lesions during wet seasons,
To find fuzz like an old lady’s mustache.

Oftentimes, the beans will be fine
Outliving the pox of mildew
But if you’ve got a notion and lack calamine lotion
Resistant beans can help you.
The Ugly Corn Plant

When a single Zea mays emerged from the soil, it didn’t look like any of the other dicots growing in the field. Why didn’t it have cotyledons? Zea’s leaves grew from a single stalk and lacked petioles. And to make matters worse, it didn’t have of any of those little purple flowers that it’s surrounding brothers and sisters in the field had. Zea had spindly silks and yellow ears, not green pods and trifoliates. Poor Zea. It’s toes felt odd in the soil next to all those root nodules.

The surrounding plants teased and threw soil clods at poor Zea because it was different from them. Zea wanted to run away, but brace roots prevented locomotion. The canopy of soybean leaves closed around and Zea could not see the beautiful soil. Zea was sad, lonely, and on the point of lodging.

But this was in Alabama on a particularly humid year with cool temperatures. An odd breeze brought some fungal creatures to the field during a summer night. These new fungal friends quickly attached themselves to the soybean plants and begin to grow. In fact, the soybean plants thought they had found some new and interesting ways to decorate their leaves. They made fun of Zea’s plain green leaves and tears flowed from it’s stomata like water droplets from an irrigation system.

The soybeans begin to feel awkward and sick. They told their fungal friends to go home, and they had enough leaf tattoos. Giggling could be heard from within the pustules and the soy was uneasy. A dark malevolence as thick as tofu could be felt by every trichome. Suddenly, a pustule broke open with a popping sound, accompanied by a sharp foliar pain. Soon, pustules were popping all over the field and beans began to break down. Some lost their leaves, bean babies went hungry, pods went unfilled. Zea was the only one who remained after Phakopsora left the field and flew north. It’s kernels fell on recently vacated and nitrogen-filled soil, ready to start a field of their own next season.
Stray DNA

Please don’t play with the stray DNA.
You’ll end up with a chlorotic tattoo.
Don’t fall for a pretty protein coat.
It’s wearer just wants to eat you.
Turning good cells against themselves,
To churn out some thick viral stew.
This may sound neat, unless you’re the treat
Feeling firsthand what foul genes can do.

I like my organs to remain my own,
Not turned to factories for clones of clones.
I don’t know many who are desirous
To play host to a deadbeat virus.
Except for some of my six-legged friends,
Who seem happy to vector a virus or ten.
Thrips and aphids and other small crits
Feed and drop off viral bits.

A virus will discolor pods
And leave soybeans with bright green bods.
There’s not much that can be done
Once viral parties have begun.
Except to stop the spread before
It ever gets to the fields door.
Plant clean seed and kill the bugs
Who like to give plants viral hugs.

Soybean vein necrosis of soybean
*Soybean vein necrosis virus (SVNV)*
Plant Battle

Every Sikora Thanksgiving, the Kudzu Commander and his Dodder Daughters face off in a grand plant battle. *Cuscuta compestris* vs. *Pueraria montana*: which fine vine will climb and entwine to win this time?
Almost Compost

Once proud and green, the broken stem lingers,
After bean pods are plucked by the combines fingers.
The last leaves languish on the soil,
Waiting for rest after summer’s long toil.

Along comes the farmer to chop up the stalks,
A funeral dirge is heard as he talks:
“Come with me plant friends, it is time for a rest,
In a place without weeds, disease, or plant pests.

First, the purgatory of being buried by soil
Free from the surface that’s full of turmoil
You’ll find that it’s warm, the dirt is grand,
Where microbes digest while worms lend a hand.

When spring comes around, you’ll get a new view,
But I’m sad to say, you won’t look like you.
This doesn’t mean there is reason to mourn,
Nor should it bring a feeling forlorn.
When the field is left with no fruit to boast,
All of the residue will soon be compost!”

The Grim Reaper
aka the combine
At Field’s End

Under the wide and starry sky
Plant the seed and let it lie.
Glad did it grow and gladly die,
And the stalks were buried by till.

This be the verse you grave for me,
Here she farms where she longed to be
Home is the farmer, home from the field,
And the pickup home from the road.

Old farmer at rest
Vestigus rusticus
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If you want real expertise on plant disease management in row crops, check out the resources from the Crop Protection Network (www.cropprotectionnetwork.org) or ask you local land-grant extension pathologist.

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This is the back of a book containing vibrant verse, pithy poetics, prodigious prose, and plant-based pictures pertaining to pathogens. There are no witty words here ascribing wonderful worth to this work as few have recognized the groundbreaking precedent set forth by the colorful content contained by the covers. It could be this work is bold and brave, or perhaps ridiculously repugnant, which is another way of saying it is ahead of its time.

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