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Australian Locust Thrive, Rocky Mountain Ones Disappear

A plague of locusts of biblical proportion has hatched and is growing as Australia, the fourth largest grain exporter, has gone from 13 years of bone-dry drought to the wettest September since the inception of record keeping in 1860.

The hatch of late August is of epic size with an astounding 80 percent survival rate, three times greater than the normal rate.

A half-mile wide swarm of Australian Plague locusts (*Chortoicetes terminifera*) can chew through 10 tons of crops a day. They move slowly in the day but at night they fly high and fast, traveling distances of over 120 miles.

In an attempt to protect a bumper harvest Australian bio-security agencies have sprayed insecticides over 600,000 acres. Bee scientists around the nation are predicting high death rates amongst honey and native bee populations as a result of these synthetic toxins. Yet, the grain harvest from Down Under is especially important this year because this past summer Canada, China and Pakistan were flooded, while Russia and parts of the Ukraine were drought-ravaged. The effects of global warming are beginning to severely deplete the world's grain stockpiles.

Locusts are highly mobile grasshopper likened as the Olympians of the 10,000 grasshopper species worldwide. Locust outbreaks occur on every inhabited continent.

Settlers in the 19th century witnessed blackened skies with trillions of Rocky Mountain locust sweeping across the North American continent in swarms larger than any known biological phenomenon on Earth.

And then all of a sudden they vanished. In fact, the last small swarm was spotted in Manitoba in 1902.

It's a modern day whodunit that took a century before entomologist Professor Jeffrey Lockwood of the University of Wyoming finally solved it.

The Rocky Mountain locust or *Melanoplus spretus* was the despicable black knight of the North American continent. In essence it was the equivalent of an 18th century Darth Vader.

The last major outbreak was recorded between 1874 and 1877. An infestation of at least seven trillion insects destroyed in excess of \$200 million of crops -- valued today at \$123 billion of damage or half the value of the entire U.S. agriculture industry.

In 1875, a swarm measuring 124 miles long by 37 miles wide moved at a rate of 11 mph and an estimated 3.5 trillion locusts devoured an area in North America approximating the size of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont.

Rocky Mountain locust outbreaks were cyclical and driven by drought.

Locust swarms descended from the Albertan, Montanan and Wyoming Rockies in June.

As the locust advanced south and east as they mated. Females laid clusters or pods of about 30 eggs and buried them in the soil. Those adults lived for about two months.

Summer hatches underwent five growth phases, matured and hibernated over winter, awakening in the warmth of May.

Populations would accumulate over three or four years before entering biblical plague proportions.

Hot dry weather weakened plants defense mechanisms and increased the nutritional value of the vegetation as sugars and other nutrients concentrated in leaves.

And prolonged droughts sped up the locust life cycle resulting in a faster breeding cycle.

Finally, droughts restricted lush vegetation to swales (well tended agricultural fields), locusts aggregated and then over crowded, ravenous swarms began to disperse *en masse*.

In addition, these colossal swarms were assisted across the prairies by the Great Plains low-level jet stream.

Prior to European settlement about 45 million bison roamed the plains consuming about 11

million tons of vegetation a year.

Aperiodic Rocky Mountain locust outbreaks estimated by Professor Lockwood supported 15 trillion locusts as these insatiable insects destroyed about 8.8 million tons of plant life in one summer.

In the late 1980s, ice cores from Knife Point Glacier, Wyoming unearthed 250, intact, frozen Rocky Mountain locust. They clearly revealed the evidenced of 300 years of outbreaks that commenced in the 17th century.

Lockwood's team was now able to assemble all the necessary pieces of the jigsaw puzzle and conclusively solve why the Rocky Mountain locust vanished.

In the 1870s more than two million settlers were transplanted across the Western North American prairies.

Populations of Rocky Mountain locust spread across Alberta, Montana and Wyoming of say 10 million; each required about 2,400 acres of either river bottoms, sunny uplands or subalpine grassy areas providing a permanent breeding ground, thus enabling swarms to eventually attain trillions of insects.

These permanent populations buried their eggs in well-drained soils.

It just so happened that the permanent Rocky Mountain locust breeding grounds were the exact fertile sites that the early settlers chose to cultivate. Hence egg masses were either flooded to death or ploughed under.

The awesome short and tall prairie grasses of North America were able to sustain millions of bison and trillions of Rocky Mountain locusts.

The reason in large part why the prairies are so rich is due to the hidden half, the incredible world of soils. Plant roots and soils are living, breathing, breeding communities of trillions of bacteria, fungi, protozoa, nematodes, micro-arthropods, worms, beetles and so much more. They decompose recently died plant materials and add them to the humus layer, ensuring structure, aeration and water retention of the soil. Plant roots actively release food into the soil to promote micro-organism development.

Modern agriculture systems use chemical pesticides, fumigants, fungicides, herbicides and fertilizers that kill a vast range of beneficial micro-organisms. Micro-organisms promote healthy plant growth, boost plant defense mechanisms and naturally break down pollutants in the soil. In fact, conventional agriculture has reduced bacterial numbers from trillions per gram of soil in the root zone to a mere couple of million.

The grandfather of organic farming, Sir Albert Howard, understood that any agriculture system is only as good as its soil. I am thrilled to report that organics is the fastest growing business sector in the U.S. exceeding \$25 billion last year.

Today, some 340 million North Americans' rely on these exact soils for our daily sustenance - these soils must be very carefully managed especially since unprecedented droughts are forecast for the coming decades.

Dr Reese Halter is a Science Communicator: Voice for Ecology, conservation biologist at California Lutheran University, public speaker and author of The Incomparable Honeybee.

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