2022 Crop Production Shortcourse

Weed Control

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COOPERATIVE EXTENSION SERVICE Mississippi State University

Herbicide Resistance

Prevention and Detection

Selective herbicide use began in the 1940's with the discovery of 2,4-D. This new miracle compound killed many broadleaf weeds without damage to grassy plants, adding a new dimension to crop production. Producers could easily and economically control broadleaf weeds in grass crops that previously required mechanical or hand-removal. Use of these materials spread rapidly and has continued to grow with the discovery and registration of new herbicides.

Weeds vary in susceptibility to herbicides. Some weeds tolerate herbicides while others do not. For example, morningglory and other broadleaf plants tolerate Fusilade 2000, while annual and perennial grasses do not. Herbicide labels and weed response tables in Extension and other publications provide growers with this information. But, there is also variation in control within a particular genus or species. Selected plants of a species normally controlled by a herbicide may require slightly higher application rates for an acceptable level of control. For example, in a particular field or year, Treflan may not control smooth pigweed as well as it does in other fields or years. Similarly, spiny amaranth (also known as spiny pigweed) may not be controlled as well as smooth pigweed. One rarely obtains 100 percent control of any weed species with any herbicide.

A number of factors influence weed control. Lack of control may be attributed to target coverage, application method, herbicide rate, environmental conditions before, during, or after application, or weed size and development at application time.

Lack of control may also be due to the genetic ability of a weed to tolerate or resist the herbicidal properties of the pesticide. The Weed Science Society of America has defined resistant weeds as "species or a biotype of a species that originally was controlled by a specific herbicide that is no longer effective."

Resistance may not be detected for many years, that is, until a high percentage of the targeted species survive the herbicide treatment. The resistant-weed biotypes survive to produce seed, and the population grows. As the population of resistant weeds increases in relation to susceptible plants, one may suspect resistance, especially if this observation is made more than one year. Factors, such as seed production and longevity, seed survival, germination rate, seedling hardiness, growth rate, and competitiveness of the susceptible and resistant biotypes, influence the speed at which the resistant population grows.

Herbicide resistance has become an issue in Mississippi. By 1992, populations of johnsongrass resistant to the acetyl-coenzyme A carboxylase (ACCase) herbicides [fluazifop-P (Fusilade 2000®) and quizalofop-P (Assure II®)], common cocklebur resistant to imidazolinone herbicides [imazaquin (Scepter®) and imazethapyr (Pursuit®)], common cocklebur resistant to arsenical herbicides [DSMA (DSMA Liquid®, DSMA Slurry®, Ansar 8100®, and other trade names) and MSMA (Crabgrass Killer®, Ansar®, Bueno®, Daconate®, and other trade names)], goosegrass and johnsongrass resistant to dinitroaniline herbicides [trifluralin (Treflan®, Tri-4®, Trilin®, etc.) and pendimethalin (Prowl®)], and ryegrass resistant to a sulfonylurea herbicide [sulfometuron (Oust®)] have been found and resistance confirmed.

Confirming herbicide resistance in a weed population is a slow process. Seed or other propagation material must be collected, plants grown to treatment size in a controlled environment, treatments applied, and results evaluated. Collected seeds may require an after-ripening period or storage at freezing temperatures before germination occurs. Seedlings from a susceptible parent (preferably one that has never been exposed to the suspected herbicide) must be grown and treated with the resistant seedlings for comparison purposes. This process can require from several months to one year after the initial collection. Fortunately, there is an ongoing effort to develop techniques for quicker resistance detection.

Often, one must evaluate the situation in the field to try to determine the reason for lack of control. If several weed species that should have been controlled by the herbicide are detected, resistance probably is not the cause for lack of control. Likewise, if a pattern of no control can be detected, or if adverse environmental conditions existed at the time of application, the control failure can probably be attributed to factors other than herbicide resistance. If, however, all except one, susceptible weed species were controlled, herbicide resistance might be suspected. When resistance is suspected, contact the local county Extension agent to initiate the process of resistance testing.

Judicious herbicide selection and use can delay the development of a resistant-weed population. Crop rotation is often touted as the primary tactic against herbicide resistance, because crop rotation often mandates use of different herbicides with different modes of action. However, crop rotation may not be necessary if several alternative herbicides are available to enable one to use a herbicide with a different mode of action in that crop. For example, imidazolinone-resistant cocklebur can be controlled in soybeans with other herbicides that have a different mode of action, such as bentazon (Basagran®). Although ACCase-resistant johnsongrass can be controlled with clethodim (Select®) in cotton or soybeans, no one can determine if or when resistance to Select® will occur. Therefore, it would be wise to use glyphosate (Roundup®) as a wiper treatment, spot treatment, or after harvest for johnsongrass control in cotton or soybeans rather than continued repeated use of clethodim (Select®) on those resistant populations.

Crop rotation will not delay weed resistance if herbicides with similar modes of action are used in the rotation crop. In the example just mentioned, rotation from cotton to soybeans would not help control resistant johnsongrass because many of the same herbicides are used in both crops. But, rotation to corn and use of nicosulfuron (Accent®) or primisulfuron (Beacon®) for johnsongrass control would alternate the herbicide modes of action.

Use of herbicides that contain more than one active ingredient in the formulation, or premixes, may help control certain herbicide-resistant weeds. This will be an effective treatment alternative only if both ingredients were initially effective on that particular weed.

Lastly, if a resistant-weed population has been detected, one should use all available control methods to avoid seed deposition in the field. Hand-removal following cultivation may be economical if the end result is to avoid spread of a herbicide-resistant weed population.

Table 1 contains many of the herbicides routinely used in crop production in Mississippi, along with the modes of action of these herbicides. This information can be useful to plan weed control tactics that include herbicide rotation so that herbicides with similar modes of action, or in the same families, are not repeatedly used year after year.

By **John D. Byrd, Jr.**, Ph.D., Extension Weed Specialist, **William L. Barrentine**, Ph.D., Plant Physiologist, Delta Research and Extension Center, Stoneville, and **David R. Shaw**, Ph.D., Professor of Weed Science

Publication 1907
Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. HIRAM D. PALMERTREE, Director
(2M-9-93)

1993

Publication 1907

Roundup Ready SOYBEANS
FOR OVER THE TOP APPLICATION

January 29, 1996

1996

ANNOUNCING

THE MARKET APPROACH FOR ROUNDUP READY™ SOYBEANS

Monsanto is pleased to announce the market approach for Roundup Ready™ soybeans.

Roundup Ready soybeans received final U.S. approvals last May, when the Environmental Protection Agency (EPA) announced it would allow Roundup® herbicide application over the top of Roundup Ready soybeans. Roundup Ready soybean seed will be available to U.S. growers this spring.

Roundup Ready soybeans free growers from the limitations of currently available weed control options in soybeans. With Roundup Ready soybeans, growers will have the widest window of application, broad-spectrum control of large and small weeds, including perennials, and outstanding crop safety with no carryover and maximum yield.

Roundup Ready soybeans contain patented seed technology, which creates a new relationship among the grower, the seed company and Monsanto. Growers who purchase Roundup Ready soybean seed will sign an agreement to ensure they understand the benefits and responsiblities associated with this new technology before making their purchase decisions. The enclosed brochure and press release provides you with detailed information about the Monsanto Roundup Ready Soybean Grower Agreement.

We appreciate any assistance you can provide in helping soybean growers learn more about the Roundup Ready market approach and use of this new technology. Your role is important in positioning to growers the new responsibilities and benefits that come with biotechnology products. Should you have any questions, or if we can help you further, feel free to contact your local Monsanto Product Development Manager or your Monsanto Local Market Manager.

Sincerely,

B. A. Alesii
Manager, Roundup Ready Soybean Technology

P.S. We are also enclosing Roundup® and Roundup® Ultra Supplemental Labels For Use In Soybeans.

/enclosures (3)

GROUP 17 HERBICIDE

Drexel

MSMA 6 Plus

MSMA Liquid Plus Surfactant

For selective post-emergent weed control in Cotton, Golf courses and Sod farms, and Highway Rights-of-Way.

ACTIVE INGREDIENT:

Monosodium acid methanearsonate*	47.6%
OTHER INGREDIENTS:	52.4%
TOTAL:	100.0%

* This product contains 6 pounds of MSMA per gallon.
* Total Arsenic (as elemental), all in water-soluble form, is 22.0%.

KEEP OUT OF REACH OF CHILDREN

CAUTION

PRECAUTIONARY STATEMENTS *(Cont.)*

All mixers, loaders, applicators and other handlers must wear: Long-sleeved shirt and long pants, chemical-resistant gloves, and shoes plus socks.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

When handlers use aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for Agricultural Pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements

DOW

PREMERGE® DINITRO WEED KILLER

GENERAL INFORMATION

PREMERGE® dinitro weed killer is a water soluble formulation of 2-sec-butyl-4,6-dinitrophenol (DNBP) that is effective in both **preemergence** and **postemergence** applications to control many annual broadleaved weeds and grasses such as: lambsquarters, redroot pigweed, Florida pusley, purslane, common ragweed, crabgrass, chickweed and foxtails. Higher rates of application are needed to control seedling grasses than seedling broadleaved weeds. It may only partially control certain vigorous annual weeds and grasses, particularly under drought or cool weather conditions, and will not ordinarily control established perennials.

TYPES OF TREATMENT

Preemergence Treatment: (Application after the crop is planted but before crop plants emerge): For best results the soil surface should be free of clods and trash, moist and fairly firm. Results are usually improved by delaying application until 1 to 3 days before crop emergence. Light or moderate rainfall after treatment is desirable but heavy rain may cause excessive leaching of the chemical with resultant lower weed control. Under very dry or cool conditions following application, weed control may be unsatisfactory unless sprinkler irrigation is used. After crop emergence, start cultivation as soon as weed growth warrants.

Postemergence Treatment: (Application after crop plants emerge): For best results weeds [illegible] sprayed when they are small seedlings. Apply PREMERGE [illegible] when crop foliage is dry, using low pressure (25 to 50 psi). [illegible] burning of leaves of crop plants, but the effect is usually [illegible] more effective and less PREMERGE is required at higher [illegible] volume to give uniform and complete coverage of all [illegible].

[illegible] low spray drift to contact desirable crop plants including [illegible] recommended under **USE DIRECTIONS** which follow.

USE DIRECTIONS

[illegible] essed on the basis of overall or broadcast coverage. For [illegible] of spray required will be proportionately less, depending [illegible] ed.

[illegible]): Preemergence—Use 2½ to 3 gallons of PREMERGE [illegible] per acre at time of, or shortly after, planting. Do not use [illegible] soils containing little or no organic matter. **Emergence**—[illegible] eatment until just before or during early emergence when [illegible] the "crook" stage. Use 1 to 1½ gallons of PREMERGE in [illegible] acre as an overall spray.

[illegible]etcorn): Preemergence—Use 2½ to 3 gallons of PREMERGE [illegible] er acre as an overall spray at time of planting. **Postemer-**[illegible] f PREMERGE in about 30 gallons of water per acre as an [illegible] g grasses and broadleaved weeds that have emerged. [illegible] the 2-leaf stage and weeds are very small. Partial burn-[illegible] arily harmful. Burning may be more severe if spraying is [illegible] er some conditions, 2 to 3 quarts of PREMERGE per acre [illegible] newly emerged broadleaved weed seedlings.

[illegible]kins and Squash): Preemergence—On cucumbers use 1 [illegible] gallons of water per acre after planting, but before crop [illegible] squash apply 1 to 2 gallons of PREMERGE in about 30 gal-[illegible] inting but before crop emergence. Use the higher rate on [illegible] e cucurbit seeds at least one inch deep. Do not use on very [illegible] soil is to be covered with plant protectors. Do not use after

[illegible]adino Clover, Red Clover, Sweet Clover and Birdsfoot [illegible]: Use 1½ to 2 quarts of PREMERGE in about 30 gallons [illegible] seedlings have 2 or more leaves and weeds are small. [illegible] dling grasses are a problem add 2 pounds of DOWPON® [illegible] me Spring Seedings" recommendation on the DOWPON [illegible]

[illegible] 1½ quarts of PREMERGE in about 30 gallons of water [illegible] eed appears. If new chickweed seedlings appear after [illegible] If chickweed becomes well developed, delay application [illegible] se 2 to 4 quarts of PREMERGE in 40 to 60 gallons of water [illegible] e is above 50° F (preferably above 60° F). A second appli-[illegible] good control of heavy weed growth.

[illegible]s before first cutting of hay.

[illegible] o 1½ gallons of PREMERGE in about 30 gallons of water [illegible] ctions. In some areas it may be advisable to delay application [illegible] e; this may injure mint top growth, but will not affect [illegible]

[illegible] lication (preemergence, early cracking stage, or early [illegible] or two later postemergence applications as needed, in [illegible] ctions. **Preemergence**—Use 3 to 4 gallons of PREMERGE [illegible] r acre as an overall spray. Apply at any time between **[illegible]racking Stage**—Use 2 gallons of PREMERGE in about 30 [illegible] overall spray. **Early Postemergence** (From emergence [illegible] 1 in diameter.) Apply overall using 1 gallon of PREMERGE [illegible] acre. Such an application will control weeds just coming [illegible] term residual effectiveness. Some foliage injury may be [illegible] if the temperatures are high. **Later Postemergence**—[illegible] ders, or similar devices, to protect the plants from most of [illegible] plications may be made up to one month after the early [illegible] eeds are first visible. Use 2 quarts of PREMERGE in about [illegible] gallons of water per acre.

PEAS: Preemergence—Use 2 to 3 gallons of PREMERGE in about 30 gallons of water per acre as a broadcast spray after planting but, before emergence of the crop. **Postemergence**—Use 1 to 3 quarts of PREMERGE in about 30 gallons of water per acre in ground equipment or 5 to 10 gallons of water per acre by aircraft when peas are 2 to 8 inches tall and weeds are small. Dosage required varies with maximum air temperature expected during the 24 hour period immediately following spraying. Consult the following table to determine the amount to apply under varying temperature conditions.

Maximum Air Temperature Expected Within 24 Hours	Quarts of PREMERGE To Use Per Acre	
	FOR PEAS[1]	FOR SOYBEANS[2]
Below 70° F	3	4
70° F to 75° F	2	3
75° F to 80° F	1½	3
80° F to 85° F	1	2
85° F to 95° F	Do Not Apply	2
Over 95° F	Do Not Apply	Do Not Apply

[1]Apply only when crop foliage is dry. Allow time for peas to harden following a period of cool, cloudy weather before spraying. Do not apply after flower buds are visible.

[2]Some injury to soybean plants may occur, but yields usually are not reduced. Do not spray if soil is wet.

When seedling grasses are a problem, use the same amount of PREMERGE and add an [illegible] pound of DOWPON grass killer per acre. See "pea" recommendation on DOWPON label.

Note: Do not graze animals on treated fields or feed treated forage to livestock within [illegible] 40 days of treatment.

POTATOES (Weed Control): Preemergence—Use 1 to 2 gallons of PREMERGE per acre in about 30 gallons of water and apply a few days (1 to 3) before the potatoes emerge. Apply as an overall spray. If seedling grasses are a particular problem add DOWPON grass killer to the above mixture at a rate to give 3 pounds per acre and apply in the same manner.

Note: Do not use DOWPON in sprays to be applied to White Rose or red skinned varieties.

POTATOES (Preharvest Vine Killing): Use 2 to 3 quarts of PREMERGE per acre in a spray prepared as follows: Mix 1 pint of a nonionic emulsifier (such as Triton X-100, Tween 85, or Glim) in 5 gallons of fuel oil and emulsify in 30 gallons of water; then add the PREMERGE with vigorous agitation and spray at moderate pressure. Spray 10 to 20 days before harvest during warm sunny weather. Complete coverage of vines is essential.

Note: Do not spray exposed tubers nor graze treated fields.

SMALL GRAINS (Barley, Oats, Rye and Wheat): SEEDED ALONE OR INTERPLANTED WITH A LEGUME—**Postemergence**—Use 1½ to 2 quarts of PREMERGE in about 30 gallons of water per acre when grain is 3 to 6 inches tall and weeds are small. Partial burning of grain leaves is not ordinarily harmful.

SOYBEANS: Preemergence—Use 2 to 2½ gallons of PREMERGE in about 30 gallons of water per acre and apply as an overall spray. Do not use on very light sandy soils. Some reduction in the stand of soybean seedlings may result, but this does not ordinarily reduce crop yield. **Early Postemergence**—(When soybeans have emerged and are still in the cotyledon stage before first true leaves expand): To control weeds that are up including redroot pigweed, purslane, common ragweed, annual morningglory, cocklebur, small seedling grasses and many others that emerge before or with the crop, use PREMERGE at the rate of 2 to 4 quarts per acre in 5 to 10 gallons of water applied by aerial equipment or in about 30 gallons of water applied by ground equipment. Select the rate to apply according to the preceding table, depending on the maximum air temperature expected within 24 hours after spraying.

Directed Postemergence Treatment. For this use apply when soybeans are 5 to 6 inches tall up to the time they begin to bloom. Use PREMERGE at the rate of 2 to 4 quarts per acre in 30 to 40 gallons of water for the control of cocklebur, morningglory, coffeeweed (Sesbania), pigweed and many other broadleaved weeds. Apply as directed spray through oiling type or other precision directed spray application equipment. Proportionately less of the same spray mixture will be required when only bands are treated. Direct the spray toward the base of the soybean plants to provide for maximum wetting of weeds with minimum contact of the crop. Control of coffeeweed and grass seedlings will be improved by the addition of 2 quarts of a surfactant such as MULTI-FILM X-77 in each 100 gallons of spray. Soybean leaves wet by the spray will be injured; however, when confined to the base of the plants, there will usually be no reduction in yield. TO AVOID CROP INJURY SPRAY MUST NOT BE APPLIED HIGHER THAN ONE-HALF THE HEIGHT OF THE SOYBEAN PLANTS. Repeat the directed application once or twice at 7 to 14 day intervals, if needed. Do not use after soybeans begin to bloom. **Note carefully: Do not graze or forage treated soybeans within 3 weeks after treatment.**

STRAWBERRIES: On strawberries in the Northwest, applications in early spring and immediately following harvest are effective on established plantings, using 4 to 6 quarts of PREMERGE in 40 to 60 gallons of water per acre.

FRUIT AND NUT ORCHARDS AND GRAPE VINEYARDS IN IRRIGATED AREAS IN CALIFORNIA: Use PREMERGE at the rate of 3 to 3½ gallons in 30 to 100 gallons of water per acre to control annual weeds and grasses under conditions specified below. The addition of 1 to 2 gallons of emulsifiable summer oil per 100 gallons of spray will improve the kill of large weeds and emerged grasses. For best results the soil surface should be moist from rainfall or irrigation at the time of treatment. Moderate rain, basin or sprinkler irrigation soon after application aids in residual preemergence control. Furrow irrigation will not move the PREMERGE into the soil adequately under the vines or tree rows. On emerged weeds and grasses, best results are obtained when post-treatment irrigation is delayed until topkill is apparent. Do not disturb treated soil until required by loss of residual weed control.

Note: Do not allow livestock to graze on treated ground cover.

For Bearing Orchards and Bearing Grape Vineyards: Spray the areas under almond, peach, pear and prune (plum) trees and grapevines using PREMERGE at the rate of 3 to 3½ gallons per acre in enough water to obtain good coverage. Apply as a directed spray with the spray striking no more than 6 inches high on the tree trunks and grape stems. Treat a band of soil surface the width desired for weed control, using amounts of spray proportional to the area actually treated. Apply during the dormant period and prior to bloom, either before the weeds come up or when they are in the young stage. Uniform soil coverage is essential for uniform results.

For Non-Bearing Fruit and Nut Plantings: Spray the areas under trees of peach, pear, prune (plum), almond and walnut, using PREMERGE at the rate of 3 to 3½ gallons per acre in enough water to obtain good coverage. Use as directed spray with the spray striking no more than 6 inches high on the tree trunks. Treat a band of soil surface the width desired for weed control, using amounts of spray proportional to area actually treated. Apply any time as needed when conditions are favorable for best results. Keep spray off foliage and succulent growing terminals.

DAFFODILS, TULIPS, AND SIMILAR FALL PLANTED BULBS: Preemergence—Spray in late fall following emergence of winter annual weeds using 1 to 2 gallons of PREMERGE in about 30 gallons of water per acre. Do not apply after bulb shoots emerge above ground.

WARNING

KEEP AWAY FROM FEED OR FOOD PRODUCTS

POISON

CAUTION—DO NOT DROP IF LEAKING DON'T BREATHE FUMES TOUCH CONTENTS SWALLOW

property described by name and are packed and marked and are in proper condition for transportation according to the Regulations prescribed by the Department of Transportation

THE DOW CHEMICAL COMPANY

DINITRO PHENOL SOLUTION

GLADIOLUS: Preemergence—Use 2½ to 3½ gallons of PREMERGE in about 30 gallons of water per acre as an overall spray, preferably just before crop emergence.

GENERAL CONTACT WEED CONTROL: Treat when vegetation is young and succulent. Use 2 to 3 quarts of PREMERGE per acre in a spray prepared as follows: Mix 1 pint of a nonionic emulsifier (such as Triton X-100, Tween 85, or Glim) in 5 gallons of fuel oil and emulsify in 30 gallons of water; then add the PREMERGE with vigorous agitation and spray at moderate pressure. Complete coverage of foliage is essential. Apply during warm, sunny weather for best results.

Local conditions affect the use of herbicides. State agricultural experiment station or extension service weed specialists in many states issue recommendations to fit local conditions.

USE PRECAUTIONS

To avoid staining of carpets, upholstery, etc., keep contaminated clothing and shoes outdoors until cleaned. Rinse equipment and containers with water and dispose of wastes by burying in non-crop land away from water supplies. Dispose of empty containers by punching holes in them and burying with wastes.

This product is toxic to fish and wildlife. Keep out of lakes, ponds and streams. Birds feeding on treated areas may be killed. Do not apply to any area not specified on this label.

Not for use or storage in or around the house.

DANGER

ABSORBED THROUGH THE SKIN • MAY BE FATAL IF SWALLOWED
Do Not Get in Eyes, on Skin, on Clothing • Avoid Breathing Spray Mist
Do Not Take Internally • Do Not Wear Contaminated Clothing or Shoes
Keep Away from Heat and Open Flame
Keep Out of Reach of Children and Farm Animals

FIRST AID TREATMENT — POISON — ANTIDOTE

SYMPTOMS OF POISONING: Excessive Fatigue, Sweating, Thirst [illegible] Fever. If symptoms of poisoning develop from any type of exposure, SEND FOR A PHYSICIAN.

FIRST AID: Have patient lie quiet in coolest spot available [illegible] with, cool with cold compresses or by immersion in cool water.

If Swallowed, SEND FOR A PHYSICIAN. Induce vomiting by [illegible] an emetic such as 2 tablespoonfuls of table salt in a glass of warm water; repeat until vomit fluid is clear, then give two teaspoonfuls of baking soda in a glass of warm water. Treat as in FIRST AID, above.

If Splashed in Eyes, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention. **If Spilled on Skin,** immediately remove contaminated clothing, **including shoes,** and wash skin with soap and plenty of water. If symptoms of poisoning develop, send for a physician and treat as in FIRST AID, above. Discard contaminated clothing and shoes, or clean them thoroughly before re-use. **NOTE TO ATTENDING PHYSICIAN: Active ingredient is a metabolic stimulant. Treat symptomatically.**

NOTICE: Seller warrants that the product conforms to its chemical description and is reasonably fit for the purposes stated on the label when used in accordance with directions under normal conditions of use, but neither this warranty nor any other warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE, express or implied, extends to the use of this product contrary to label instructions, or under abnormal conditions, or under conditions not reasonably foreseeable to seller, and buyer assumes the risk of any such use.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN 48640

J670

86-1110 PRINTED IN JULY 1970

REPLACES SPECIMEN LABEL 86-1110 PRINTED IN SEPTEMBER 1969

REVISION INCLUDES: DIRECTED POST EMERGENCE TREATMENT ON SOYBEANS NO LONGER RESTRICTED TO THOSE GROWN AS SEED FOR PLANTING PURPOSES ONLY.

Active Ingredient: 2-sec-butyl-4,6-dinitrophenol, as the alkanolamine salts (of the ethanol and isopropanol series)..... 51%

Inert Ingredients..... 49%

Contains the equivalent of 3 lbs. of 2-sec-butyl-4,6-dinitrophenol per gal.

U.S.D.A. Registration No. 464-146

GUARANTEE

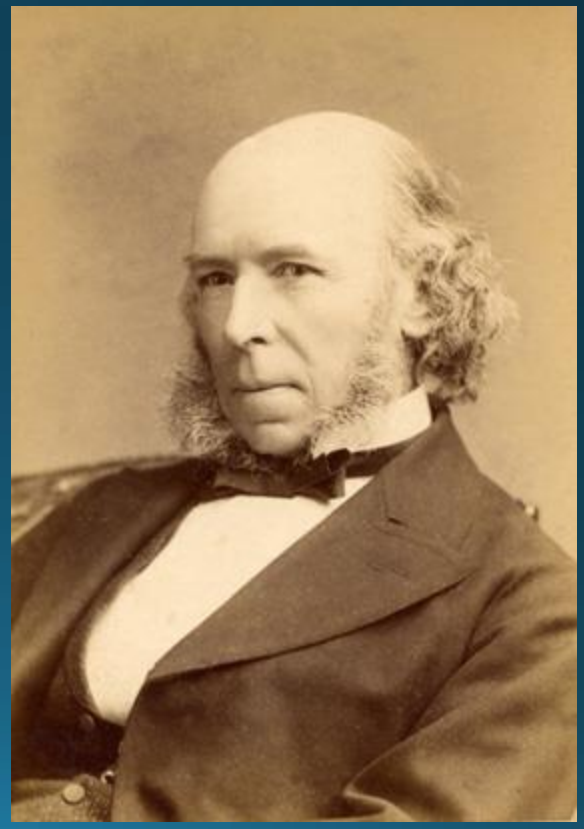
PREMERGE dinitro weed killer is guaranteed by The Dow Chemical Company to the full extent of the purchase price to provide an acceptable spray mixture, in any water suitable for spraying, which will not cause clogging of proper nozzles and screens in spray equipment.

DANGER — POISON
KEEP OUT OF REACH OF CHILDREN
Read Antidote and Complete Precautions on Rear Panel

Herbicide resistance management

http://wssa.net/weed/resistance/

- Agronomic crops
- Turf
- Non-crop land
- Aquatics



"Survival of the fittest"
Herbert Spencer

Applying the rigor of science, strength of humanity, and the intelligence of nature to transform our health & our world.

Zach Bush MD is a physician specializing in internal medicine, endocrinology and hospice care. He is an internationally recognized educator and thought leader on the microbiome as it relates to health, disease, and food systems. Dr Zach founded *Seraphic Group and the nonprofit Farmer's Footprint to develop root-cause solutions for human and ecological health. His passion for education reaches across many disciplines, including topics such as the role of soil and water ecosystems in human genomics, immunity, and gut/brain health. His education has highlighted the need for a radical departure from chemical farming and pharmacy, and his ongoing efforts are providing a path for consumers, farmers, and mega-industries to work together for a healthy future for people and planet.

INTERVIEW

Why Dr. Zach Bush believes herbicides could end life on Earth

Dr. Zach Bush went from developing chemotherapy to fighting pesticide-makers

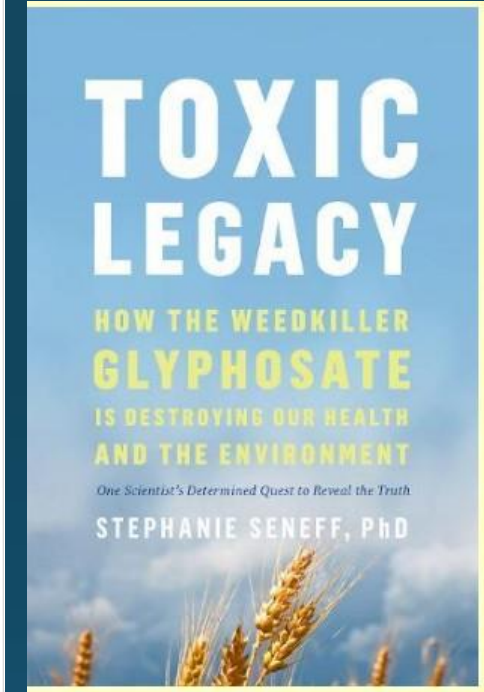
By NICOLE KARLIS PUBLISHED OCTOBER 14, 2019 6:00PM (EDT)

Stephanie Seneff: Anti-crop biotechnology MIT computer scientist morphs into anti-vaccine activist, blames weedkiller glyphosate for COVID pandemic

Updated November 22, 2021 | Genetic Literacy Project

▸ PROFILE DETAILS

Stephanie Seneff (born 1949) is an MIT computer scientist who alleges that vaccines, prescription drugs, glyphosate and GMO crops paired with the weedkiller glyphosate (Roundup) cause autism, ADHD and other health conditions.[1] While experts have widely dismissed Seneff as a fringe voice without relevant credentials, alternative health advocates, organic marketers and trade associations frequently promote her. During the COVID-19 pandemic, Children's Health Defense, a prominent anti-vaccine group headed by Robert F. Kennedy, Jr., began to amplify Seneff's speculation about the mRNA vaccines developed by Pfizer and Moderna.



WHERE TO BUY TOXIC LEGACY

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POLITICO

Concerns over glyphosate pass from human health to the soil

Experts say the weedkiller's impact on soil health represents a serious threat to Europe's long-term food security.

François Peaucellier spikes land on his neighbor's farm to show its level of biodiversity I Simon Marks/POLITICO

BY SIMON MARKS

April 3, 2019 | 6:30 pm

SCIENTIFIC REPORTS
nature research

Glyphosate-based herbicides reduce the activity and reproduction of earthworms and lead to increased soil nutrient concentrations

Mailin Gaupp-Berghausen, Martin Hofer, [...], and Johann G. Zaller

Additional article information

Abstract

Herbicide use is increasing worldwide both in agriculture and private gardens. However, our knowledge of potential side-effects on non-target soil organisms, even on such eminent ones as earthworms, is still very scarce. In a greenhouse experiment, we assessed the impact of the most

HealthDay + Follow

1 in 3 People Now Exposed to a Harmful Pesticide

Consumer news - Yesterday 7:39 AM

React | 3 Comments | 8

THURSDAY, Feb. 10, 2022 (HealthDay News) -- One in three Americans is exposed to a common and potentially harmful weed killer called 2,4-D, and children may be especially at risk, new research suggests.

Freisthler et al. Environmental Health (2022) 21:23
https://doi.org/10.1186/s12940-021-00815-x

Environmental Health

RESEARCH Open Access

Association between increasing agricultural use of 2,4-D and population biomarkers of exposure: findings from the National Health and Nutrition Examination Survey, 2001–2014

Marlaina S. Freisthler[1], C. Rebecca Robbins[1], Charles M. Benbrook[2], Heather A. Young[1], David M. Haas[3], Paul D. Winchester[4] and Melissa J. Perry[1*]

Abstract

Background: 2,4-Dichlorophenoxyacetic acid (2,4-D) is one of the most extensively used herbicides in the United States. In 2012, 2,4-D was the most widely used herbicide in non-agricultural settings and the fifth most heavily applied pesticide in the US agricultural sector. The objective of this study was to examine trends in 2,4-D urinary biomarker concentrations to determine whether increases in 2,4-D application in agriculture are associated with increases in biomonitoring levels of urine 2,4-D.

Methods: Data from the National Health and Nutrition Examination Survey (NHANES) with available urine 2,4-D biomarker measurements from survey cycles between 2001 and 2014 were utilized. Urine 2,4-D values were dichotomized using the highest limit of detection (LOD) across all cycles (0.40 µg/L or 0.4 ppb). Agricultural use of 2,4-D was estimated by compiling publicly available federal and private pesticide application data. Logistic regression models adjusted for confounders were fitted to evaluate the association between agricultural use of 2,4-D and urine 2,4-D level above the dichotomization threshold.

Results: Of the 14,395 participants included in the study, 4681 (32.5%) had urine 2,4-D levels above the dichotomization threshold. The frequency of participants with high 2,4-D levels increased significantly ($p < .0001$), from a low of 17.1% in 2001–2002 to a high of 39.6% in 2011–2012. The adjusted odds of high urinary 2,4-D concentrations associated with 2,4-D agricultural use (per ten million pounds applied) was 2.268 (95% CI: 1.709, 3.009). Children ages 6–11 years ($n = 2288$) had 2.1 times higher odds of having high 2,4-D urinary concentrations compared to participants aged 20–59 years. Women of childbearing age (age 20–44 years) ($n = 2172$) had 1.85 times higher odds than men of the same age.

Conclusions: Agricultural use of 2,4-D has increased substantially from a low point in 2002 and it is predicted to increase further in the coming decade. Because increasing use is likely to increase population level exposures, the associations seen here between 2,4-D crop application and biomonitoring levels require focused biomonitoring and epidemiological evaluation to determine the extent to which rising use and exposures cause adverse health

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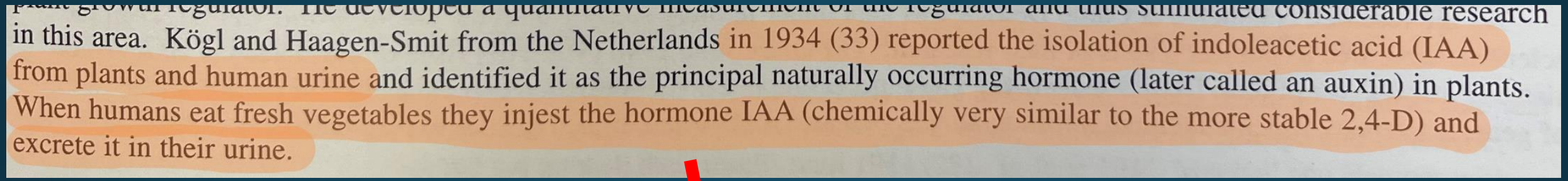

plant growth regulator. He developed a quantitative measurement of the regulator and thus stimulated considerable research in this area. Kögl and Haagen-Smit from the Netherlands in 1934 (33) reported the isolation of indoleacetic acid (IAA) from plants and human urine and identified it as the principal naturally occurring hormone (later called an auxin) in plants. When humans eat fresh vegetables they injest the hormone IAA (chemically very similar to the more stable 2,4-D) and excrete it in their urine.

"When humans eat fresh vegetables they ingest the hormone IAA (chemically very similar to the more stable 2,4-D) and excrete it in their urine."

Burnside OC 1996 The History of 2,4-D and Its Impact on Development of the Discipline of Weed Science in the United States. Pages 5-15 in Biologic and Economic Assessment of Benefits from Use of Phenoxy Herbicides in the United States. USDA NAPIAP Special Report 1-PA-96

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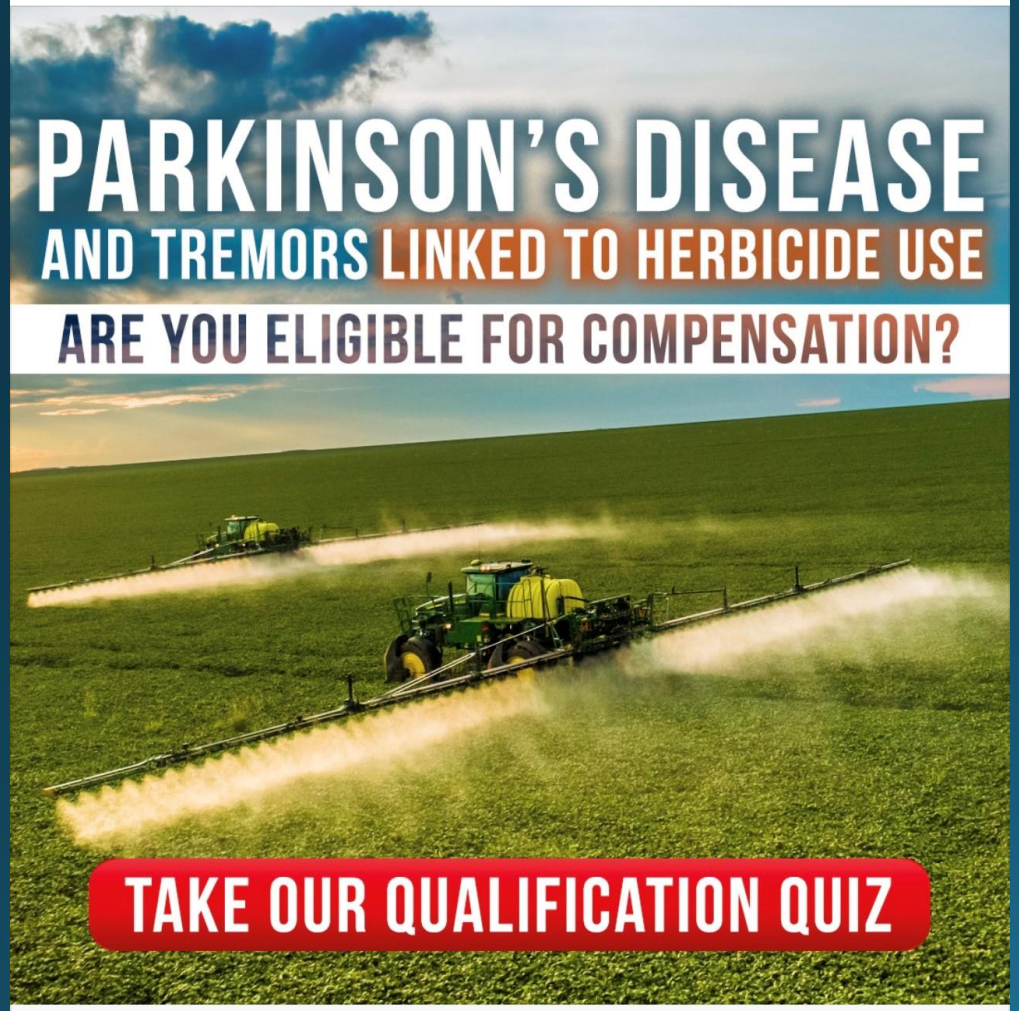
Long term Herbicide exposure has been linked to Parkinson's Disease. Individuals who have been diagnosed with Parkinson's or are experiencing symptoms... See More



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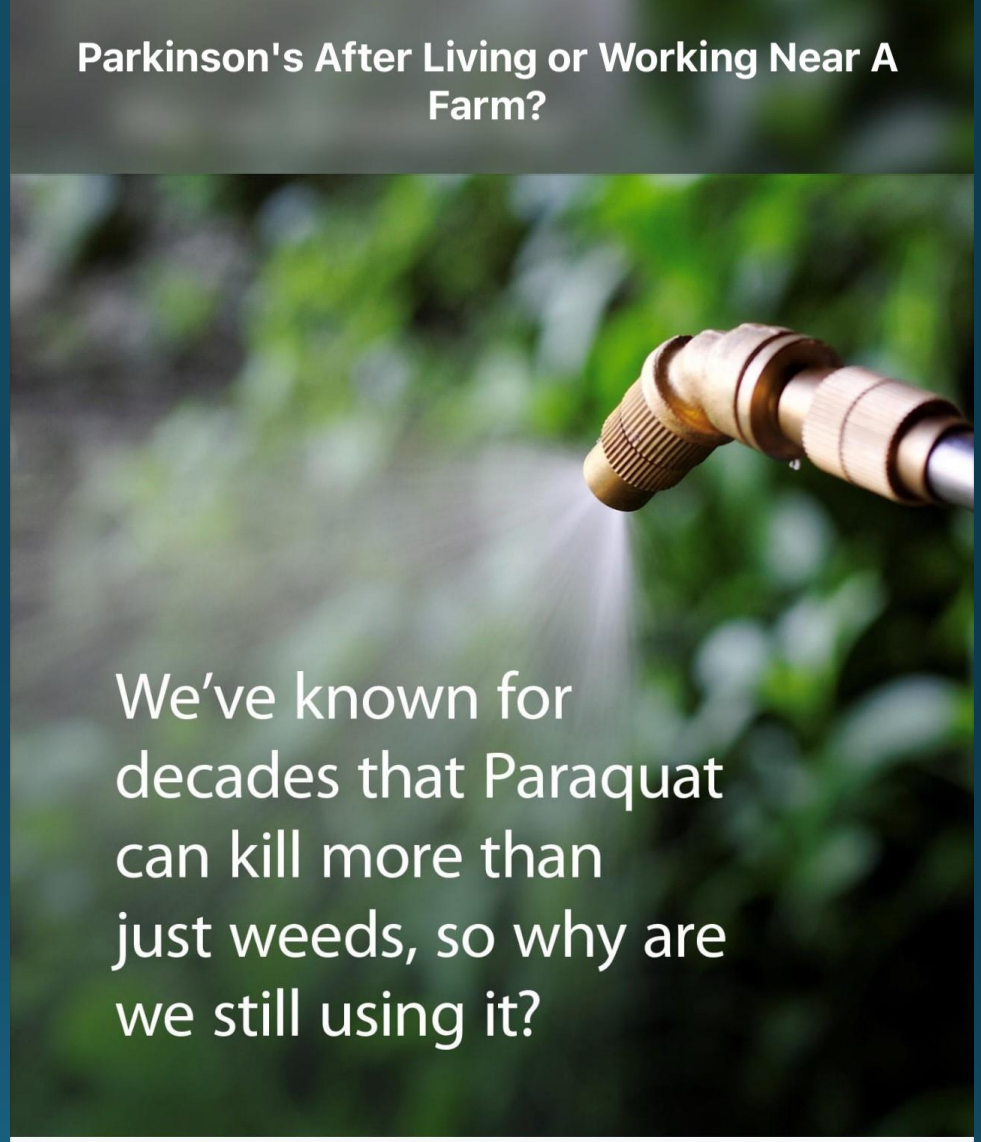

A popular herbicide has been linked to Parkinson's. Do you or a family member have Parkinson's after livin... See More

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PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

DANGER
PELIGRO

POISON

May be fatal if swallowed. Fatal if inhaled. Causes substantial but temporary eye injury. Harmful if absorbed through skin. Do not get in eyes or on clothing. Avoid contact with skin. Do not breathe spray mist. Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove contaminated clothing and wash clothing before reuse.

IMPORTANT: Inhalation is an unlikely route of exposure due to low vapor pressure and large spray droplet size, but mucosal irritation or nose bleeds may occur. Prolonged contact with this concentrated product can irritate your skin.

Personal Protective Equipment

Applicators and other handlers (other than Mixers and Loaders) must wear:

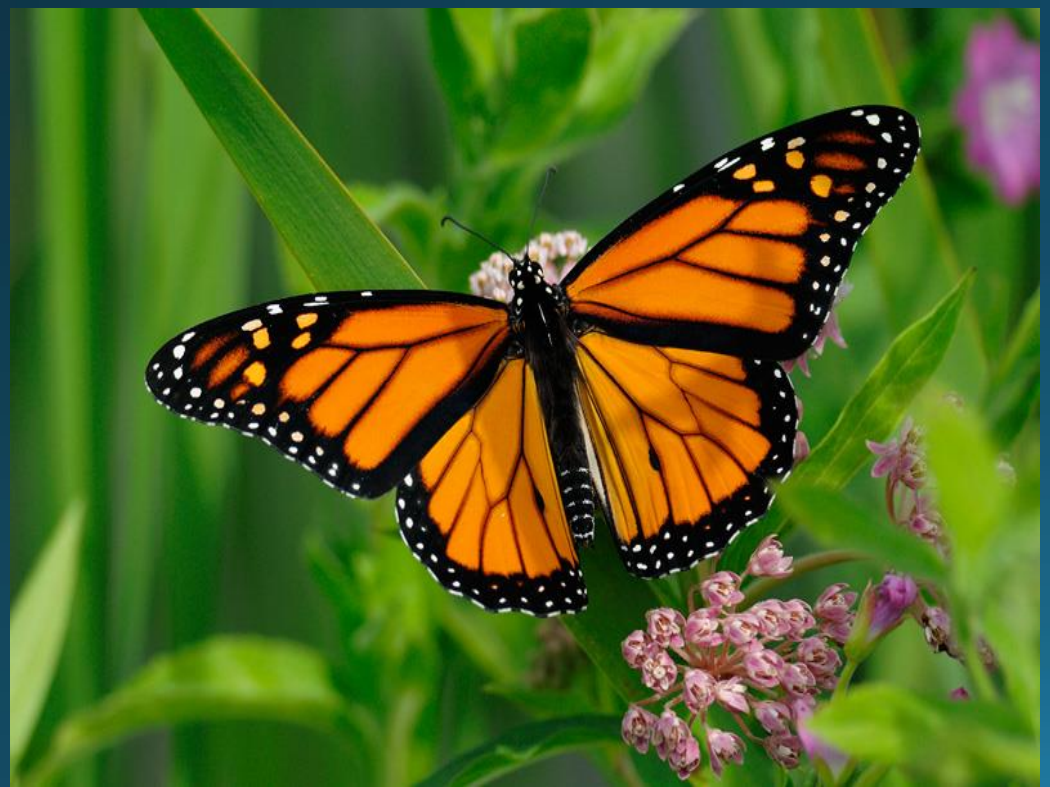
- Long-sleeve shirt and long pants
- Shoes plus socks
- Protective eyewear
- Chemical Resistant Gloves—Category A (e.g., barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinyl chloride (PVC) or viton).
- A dust mist NIOSH-approved respirator with any N, R, P, or HE filter.

Mixers and Loaders must wear:

- Long-sleeve shirt and long pants
- Shoes plus socks
- Protective eyewear plus a dust mist NIOSH-approved respirator with any N, R, P, or HE filter.
- Chemical Resistant Gloves—Category A (e.g., barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinyl chloride (PVC) or viton).

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use

Dec. 15, 2020, USFWS concluded adding the monarch butterfly to the list of threatened and endangered species is warranted, but precluded by higher-priority listings. The monarch remains a candidate for listing under the Endangered Species Act, and its status will be reviewed each year until it is no longer a candidate.



FOX WEATHER LIVE

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WEATHER NEWS | Published 11 hours ago

Monarchs make a comeback in California

Observers so far counted 50,000 wintering butterflies after counting only 2,000 last year. Scientists speculate why.

By Hillary Andrews

11/22/2021 Source FOX Weather

Counting the Monarchs

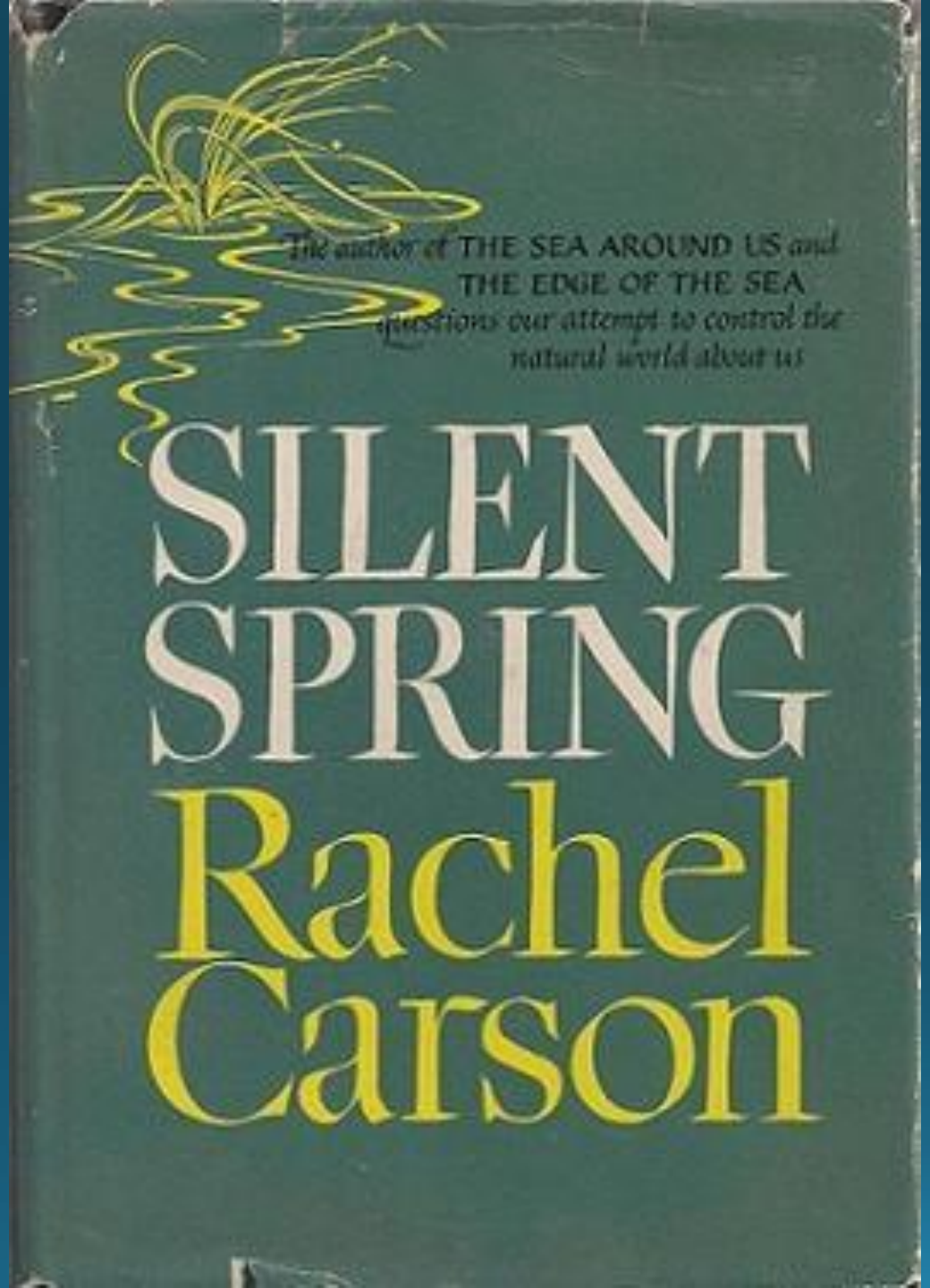
An official Monarch butterfly counter describes the process.

The monarchs are back again in force to winter along the California coast. After a dismal showing the past three

Press release | 21 Jul, 2022

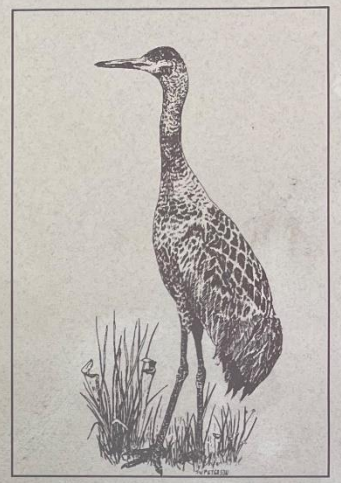
Migratory monarch butterfly now Endangered - IUCN Red List

Gland, Switzerland, 21 July 2022 (IUCN) – The migratory monarch butterfly (*Danaus plexippus plexippus*), known for its spectacular annual journey of up to 4,000 kilometres across the Americas, has entered the IUCN Red List of Threatened Species™ as Endangered, threatened by habitat destruction and climate change. All surviving sturgeon species – also migratory, found across the northern hemisphere – are now at risk of extinction due to dams and poaching, pushing the world's most Critically Endangered group of animals yet closer to the brink. The tiger (*Panthera tigris)* has been reassessed, revealing new population figures.


The author of THE SEA AROUND US and
THE EDGE OF THE SEA
questions our attempt to control the
natural world about us
SILENT
SPRING
Rachel
Carson

HANDBOOK: RESOURCE GUIDE

Mississippi Threatened And Endangered Species



Sandhill Crane

EACE

Environmental & Agricultural Chemical Education Unit

COOPERATIVE EXTENSION SERVICE

Mississippi State University

ENDANGERED SPECIES ACT

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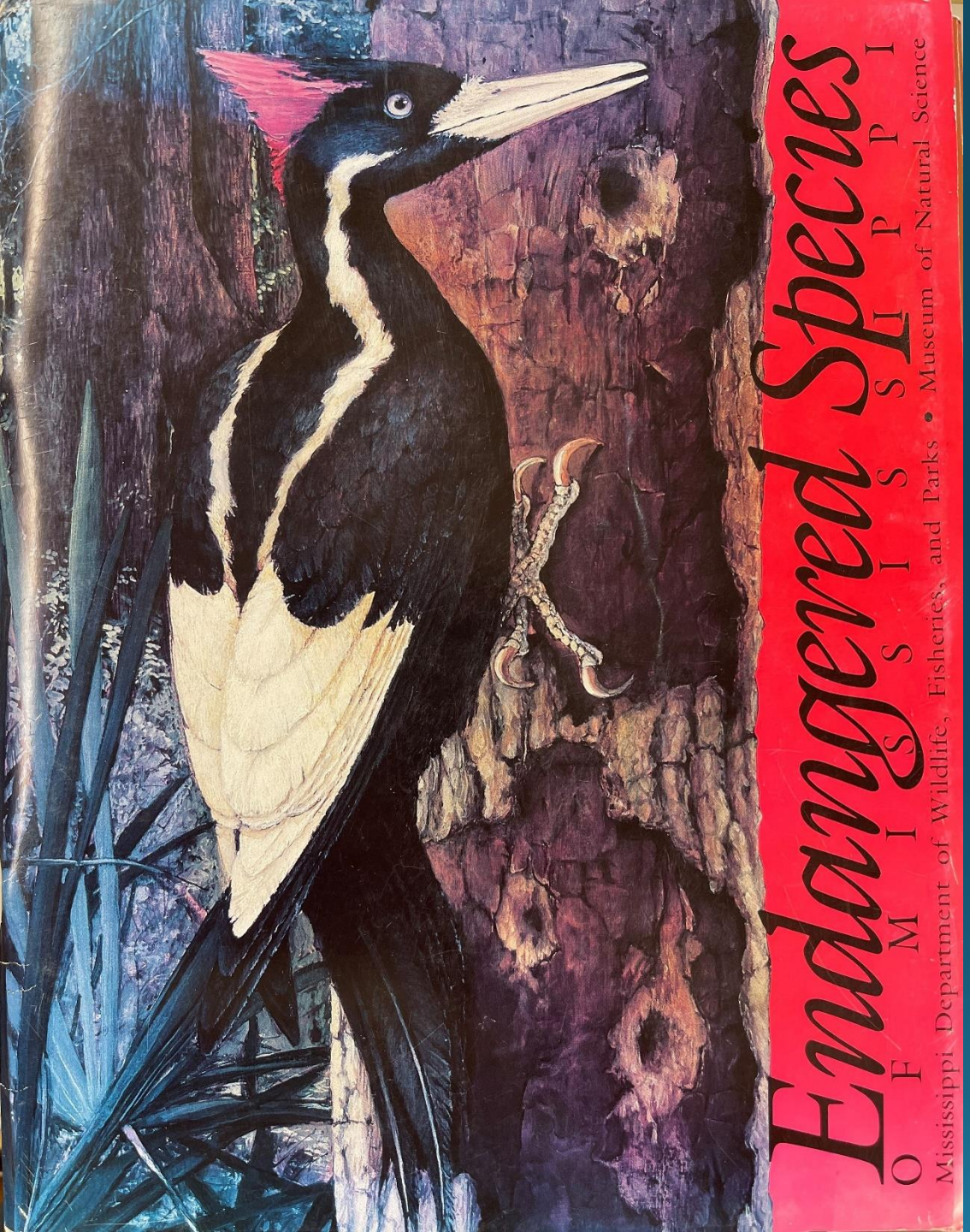
Funding to support the preparation of this handbook was provided by The Bureau of Plant Industry, Mississippi Department of Agriculture and Commerce.

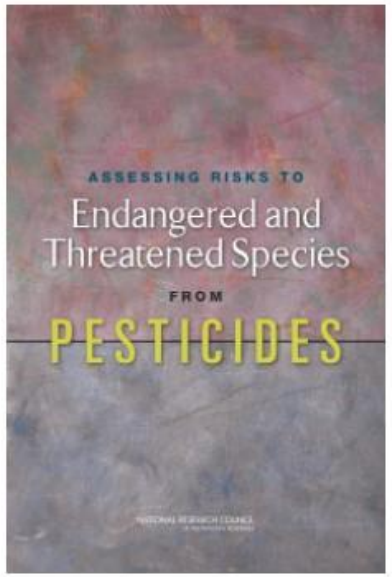


As of 1992, 53 species of plants and animals, excluding whales.

Endangered "those in danger of becoming extinct throughout all or a significant portion of their range."

Threatened "likely to become endangered in the near future in all or a significant portion of their range."

Listing or changing status begins with Petitioning USFWS or NMFS.



Assessing Risks to Endangered and Threatened Species from Pesticides

(2013)

Consensus Study Report

Contributors

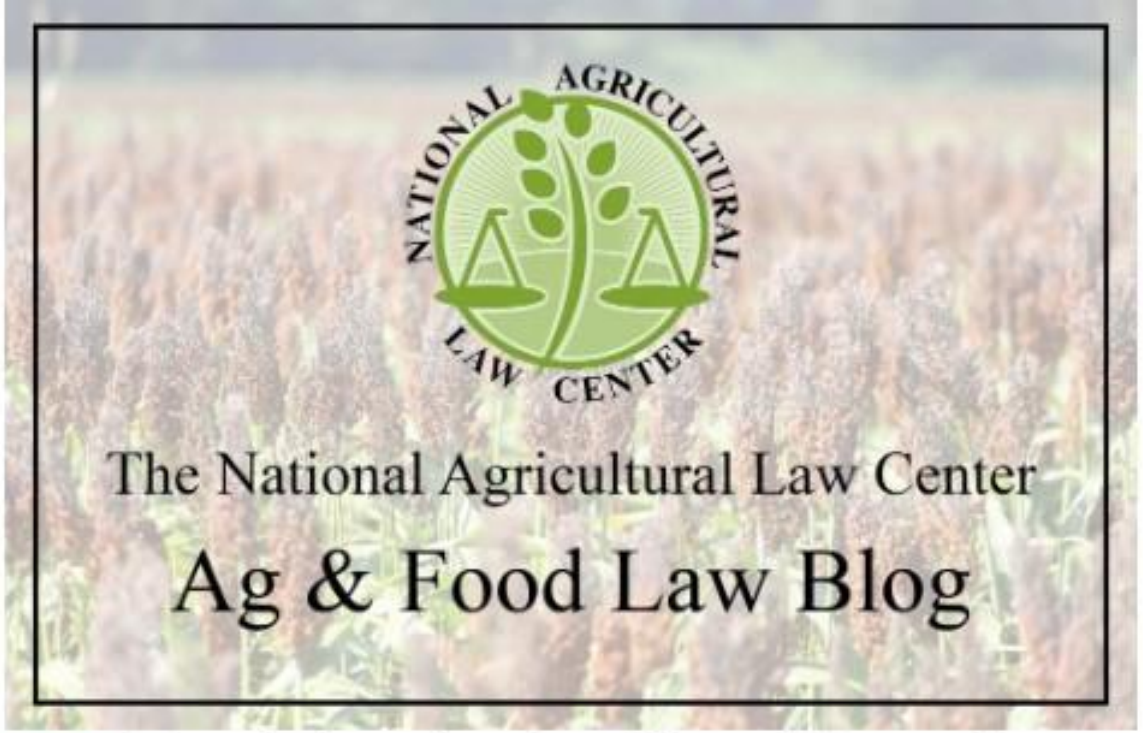
National Research Council; Division on Earth and Life Studies; Board on Environmental Studies and Toxicology; Committee on Ecological Risk Assessment Under FIFRA and ESA

RESOURCES AT A GLANCE

Press Release

From the introduction of Assessing Risks to Endangered and Threatened Species from Pesticides

Under the US Endangered Species Act (ESA), the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) are responsible for designating species as endangered or threatened (that is, listing species) and determining whether federal actions might jeopardize the continued existence of a listed species or adversely affect its critical habitat. Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the US Environmental Protection Agency (EPA) is responsible for registering pesticides and ensuring that pesticides do not cause unreasonable adverse effects on the environment, which includes listed species and their critical habitats. Over the years, EPA, FWS, and NMFS have struggled unsuccessfully to reach a consensus on approaches to assessing the risks to listed species. Consequently, EPA, FWS, NMFS, and the US Department of Agriculture (USDA) asked the National Research Council to examine scientific and technical issues related to determining risks to species that are listed under the ESA posed by pesticides that are registered under FIFRA.



17 JAN

Top Ten Agricultural Law Issues in 2019

Categorized Ag & Food Law Update, Clean Water Act, Endangered Species Act, Environmental Protection Agency, Food Labeling, Hemp, International Trade, Pesticides, Right to Farm, Underserved Communities, BIPOC

- In August, the Department of Interior announced host of new rules that made a series of changes to the **Endangered Species Act (ESA).** The new rules affect what species receive ESA protections, the designation of critical habitats, and the amount of protection afforded to threatened species. Changes included repealing the "blanket 4(d)" rule, restricting the area that can be designated as critical habitat only to areas that are currently occupied by a species, and restructuring what factors will be considered when listing a species as threatened. The changes quickly prompted backlash, and a lawsuit was filed against the Secretary of Interior soon after the rules were announced. To read more about the changes to the ESA, click here.

The National Agricultural Law Center
The Nation's Leading Source of Agricultural and Food Law Research and Information

(https://nationalaglawcenter.org/a-host-of-new-rules-brings-major-changes-to-the-endangered-species-act/)

27 AUG

A Host of New Rules Brings Major Changes to the Endangered Species Act

(https://nationalaglawcenter.org/a-host-of-new-rules-brings-major-changes-to-the-endangered-species-act/)

Categorized Ag & Food Law Update (https://nationalaglawcenter.org/category/ag-food-law-update/), Endangered Species Act (https://nationalaglawcenter.org/category/statutes/endangered-species-act/)

The Trump administration, on August 12, 2019, announced changes to the Endangered Species Act (ESA). These changes affect what species receive ESA protections, the designation of critical habitats, and the amount of protection afforded to threatened species.

Designation of Species as Endangered

Historically, section 4 the ESA required that the decisions as to which species were to be listed as endangered were based solely on the best available science "without reference to possible economic or other impacts of such determination." The new changes remove this language and allow for economic impacts to be considered. In a press

Trump administration modified language of ESA to consider economic impact of a species as Threatened or Endangered

EPA

Balancing Wildlife Protection and Responsible Pesticide Use: How EPA's Pesticide Program Will Meet its Endangered Species Act Obligations

2022

www.epa.gov/endangered-species

Triazines and Glyphosate Begin Endangered Species Act Review

The **triazines** are the **first herbicides** to go through EPA's Revised Method for Species Biological Evaluations of Conventional Pesticides. BEs make effects determinations for 1,795 endangered or threatened species and 792 designated critical habitats. EPA's draft BEs for the triazines predict:

- atrazine likely to adversely affect 54% of all species and 40% of critical habitats;
- propazine likely to adversely affect 4% of all species and 2% of critical habitats;
- simazine likely to adversely affect 53% of species and 40% of critical habitats.

EPA issued its draft BE for **glyphosate** November 27, 2020. EPA's draft BEs for glyphosate predict: glyphosate likely to adversely affect 93% of all species and 96% of critical habitats.

- EPA model assumes **max rate** of glyphosate applied **every year** on CRP and non-cropland.

TEXAS FARM BUREAU

EPA misses the mark on farm herbicide evaluations

By Jennifer Whitlock
Field Editor

Farm and ranch groups are frustrated with the final biological evaluations made by the U.S. Environmental Protection Agency (EPA) on atrazine, glyphosate and simazine.

Grower organizations, including American Farm Bureau Federation (AFBF), say EPA failed to take the groups' comments and real-world scenarios into account before releasing the evaluations showing the three common farm herbicides are "likely to adversely affect" certain listed endangered or threatened species or designated critical habitats.

The agency used unrealistic assumptions about how farmers and ranchers use these chemicals, according to AFBF and the American Soybean Association (ASA).

As an example, the biological evaluation for glyphosate assumed soybean farmers apply 3.75 pounds per acre per application, but a U.S. Department of Agriculture (USDA) survey shows the true rate is only one pound per acre—nearly four times less.

-----Original Message-----
From: Tindall, Kelly <tindall.kelly@epa.gov>
Sent: Tuesday, April 20, 2021 9:41 AM
To: Byrd, John <JByrd@pss.msstate.edu>
Cc: Orlowski, John <Orlowski.John@epa.gov>
Subject: RE: WSSA Seminar

Hey John,

I just want to take a second and check in with you about tomorrow. Are we all still good to go? Also, I wanted to see if you had any questions. One update on our end - John Orlowski will be facilitating the webinar, so I cc'ed him here to serve kind of as a virtual introduction (although, he spent time in MS, so ya'll may know each other).

Look forward to the talk tomorrow!

Kelly

Integrated Vegetation Management on Rights-of-Ways

October 5, 2021 | 2:00 – 3:30 PM ET

Thank you for attending the webinar broadcast on October 5, 2021, a part of the IPM Webinar series hosted by EPA's Center for I IPM.

On this page:

Speakers

- **John Byrd, Ph.D.** (Mississippi State Univ.) jdb4@msstate.edu
- **Moderator**: Marcia Anderson, Ph.D., EPA Center for IPM (anderson.marcia@epa.gov)

Statistical Information

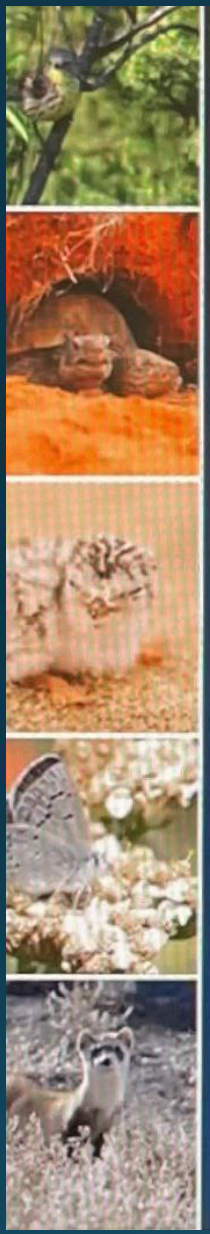
Registration

- 1177 people from 50 states, and PR, Canada, Costa Rica, Australia, Mexico Albania, Egypt, Oman, Phillippeans, India, Somalia Ecuador, Hong Kong
  - Top states: OR (120); CA (80); FL (66); AZ (53); NY (52)
  - Registration breakdown:
    - 640 Government employees (253 state)
    - 27 Tribal representatives
    - 132 schools / districts/ universities / childcare centers,
    - 356 Agricultural Forester, Master Gardener's
    - 128 Pest management professionals

Participation

- 835 from 49 states plus Canada, PR, and Mexico, Australia, Albania, Costa Rica, Oman
- 68% of those who registered attended
- 37 additional attendees included via shared spaces; = 798+ + 37
- Top states: OR (82); CA (52); FL (38); NC/PA (37); AZ/TX (34)
  - 83 schools / districts / childcare centers / Universities
  - 457 Government employees (187 state)
  - 238 Agricultural Forester, Master Gardener's
  - 98 Pest management professionals
  - 16 tribal representatives

Continuing Education Units Provided 353
ISA - 125
State licensed pesticide applicators - 208
LTEs - 7
SAF - 13



Threatened and endangered species

1900

~~1660~~ plants and animals listed as threatened or endangered under the ESA

- Terrestrial and freshwater species - U.S. Fish and Wildlife Service
- Marine/anadramous species - National Marine Fisheries Service
- Occur in all 50 states, DC, and territories
- > 500 listed species in Hawaii/Northern Marianas Islands (mostly plants)

Photo by Natalia Tangalin, NTBG

Uhi uhi
Mezoneuron kavaiensis

ESA Workplan Update: Nontarget Species Mitigation for Registration Review and Other FIFRA Actions

November 17, 2022

U.S. Environmental Protection Agency

Pesticide Groups: Herbicides

- Develop a broad approach to address spray drift and runoff transport from treated fields to minimize exposure to *listed plants* from herbicides

- Goal is to reduce the likelihood of jeopardy and adverse modification for federally listed plants and species that depend on plants

- For future herbicide biological evaluations and consultations, EPA and FWS would focus on potential effects not addressed in this strategy
  - Example: effects to animals on the treated field or newly listed species

Next Steps

- EPA will provide additional information and updates on its website as we continue to make progress on these efforts
  - Quarterly updates to ESA Workplan website: https://www.epa.gov/endangered-species/epas-workplan-and-progress-toward-better-protections-endangered-species

- Upcoming opportunities for public comment
  - Proposed label language in Appendix to ESA update (EPA-HQ-OPP-2022-0908)
  - Proposed Interim Decisions (DCNA, etofenprox, norflurazon, TM/MBC, and more)
  - ESA registration review pilots (methomyl-EPA-HQ-OPP-2010-0751, carbaryl, rodenticides)
  - EPA vulnerable species pilot
  - EPA strategies for herbicides and rodenticides

- Public feedback will inform elements of ESA workplan

Pesticide Use

- EPA is exploring grouping assessments and mitigations for certain pesticide uses

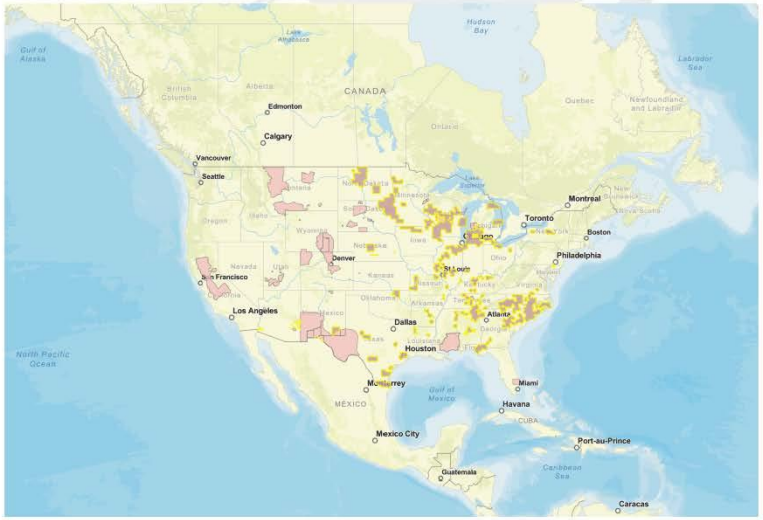
- Examples
  - Mosquito adulticides
  - Residential uses

- EPA welcomes input from various pesticide user groups to inform these strategies

Endangered Species Protection Bulletin

Application Month: June 2022
Product: All products with limitations in selected area

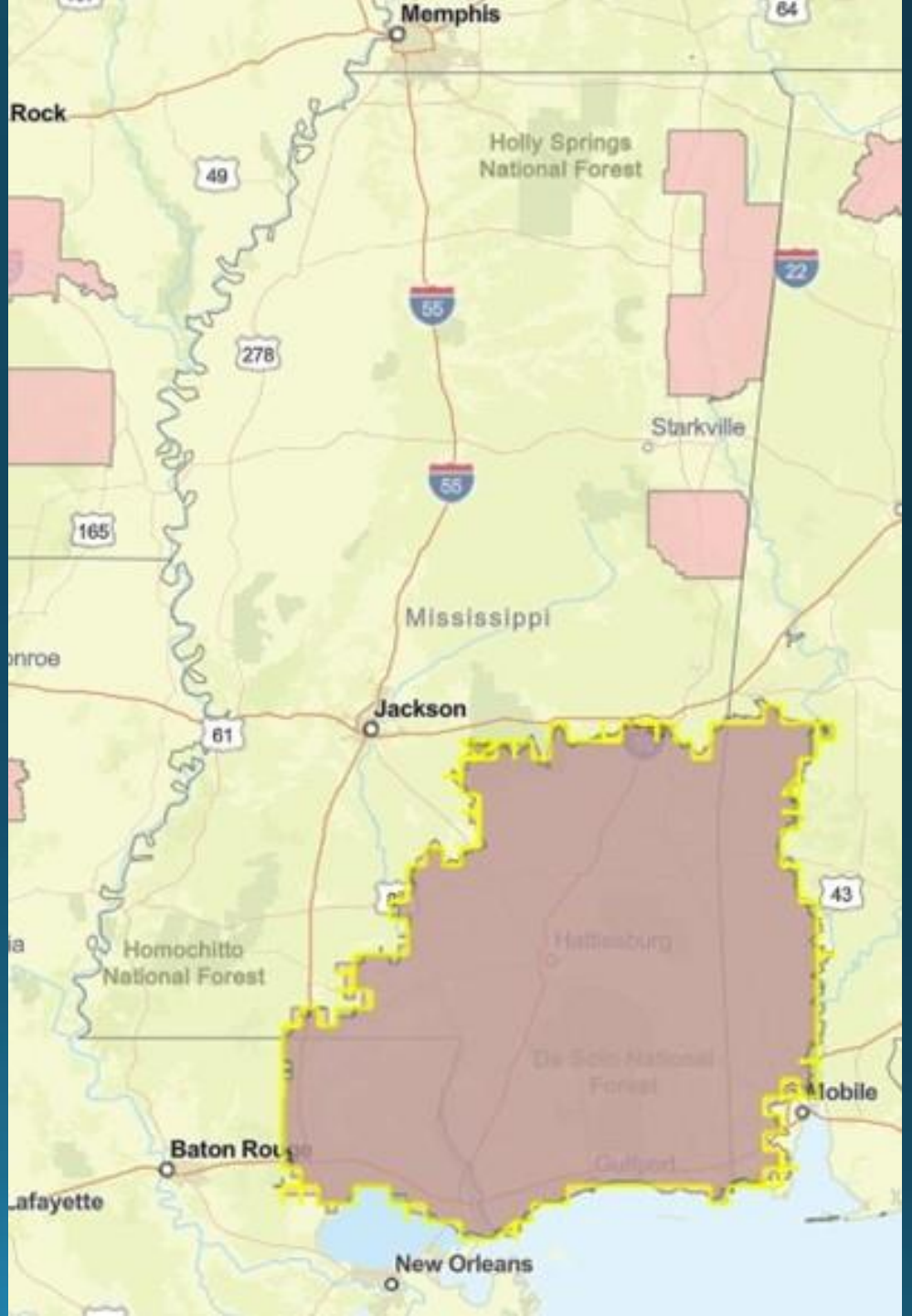
1 Areas where pesticide use must be limited are identified on the map. A legend is located beside the map to help pinpoint these locations.



Legend
Limitation Area

2 Look below at the Pesticide Use Limitation Summary Table. This table lists the user selected Active Ingredient(s) (ALs) or Product(s) with pesticide use limitations on the printed map. Locate the Active Ingredient (AI) or Product you intend to apply in this table and identify the code in the last column. This code indicates the specific limitation associated with that AI or Product. A limitation description for each code can be found below in the Codes and Limitations Table. If multiple Pesticide Use Limitation Areas (PULAs) are visible on the map, these tables provide information for the highlighted PULA.

If you are applying a pesticide that contains more than one Active Ingredient, or multiple Products, then multiple codes may apply. Follow the limitations for all codes when using this pesticide.



Endangered Species Protection Bulletin

Pesticide Use Limitation Summary Table

Product	AI	Use	Method	Form	Code
FEXAPAN PLUS VAPORGRIP TECHNOLOGY (352-938)	Dicamba, diglycolamine salt	Dicamba-Tolerant Cotton	Ground spray	Liquid	D120
FEXAPAN PLUS VAPORGRIP TECHNOLOGY (352-938)	Dicamba, diglycolamine salt	Dicamba-Tolerant Soybean	Ground spray	Liquid	D120
XTENDIMAX WITH VAPORGRIP TECHNOLOGY (264-1210) Alternate: M1768 Herbicide	Dicamba, diglycolamine salt	Dicamba-Tolerant Soybean	Ground spray	Liquid	D120
XTENDIMAX WITH VAPORGRIP TECHNOLOGY (264-1210) Alternate: M1768 Herbicide	Dicamba, diglycolamine salt	Dicamba-Tolerant Cotton	Ground spray	Liquid	D120
A21472 PLUS VAPORGRIP TECHNOLOGY (100-1623) Alternate: TAVIUM PLUS VAPORGRIP TECHNOLOGY	Dicamba, diglycolamine salt	Dicamba-Tolerant Cotton	Ground spray	Liquid	D120
A21472 PLUS VAPORGRIP TECHNOLOGY (100-1623) Alternate: TAVIUM PLUS VAPORGRIP TECHNOLOGY	Dicamba, diglycolamine salt	Dicamba-Tolerant Soybean	Ground spray	Liquid	D120

WSSA
WEED SCIENCE SOCIETY OF AMERICA

Jake Li is the Deputy Assistant Administrator for Pesticide Programs within EPA's Office of Chemical Safety and Pollution Prevention, where he works on a wide variety of pesticide issues. One of Jake's priorities is to help EPA achieve its endangered species protection goals related to pesticide decisions. Jake brings a broad and diverse set of perspectives to this work, having previously worked on the issue for environmental organizations and industry. Immediately before joining EPA, Jake worked for over a decade in the nonprofit sector on endangered species, natural resource conservation, and chemical regulatory issues. From 2018-2021, he was the Director for Biodiversity at the Environmental Policy Innovation Center, which focuses on working with private landowners and businesses to increase the speed and scale of conservation. From 2010-2018, Jake worked in various positions at Defenders of Wildlife, including as Vice President of Endangered Species Conservation. There, he led the organization's work with agriculture and agrichemical companies on improving the ESA-FIFRA process. This work also involved extensive engagement with federal agencies and congressional offices. Prior to Defenders, Jake represented the regulated community, including chemical companies, as an environmental lawyer at Latham & Watkins, LLP. Jake strives to bring his insights from working with the private sector and environmental groups to find practical, fair, efficient, and durable solutions to how EPA regulates pesticide and other chemicals. Jake has also published widely on wildlife conservation issues and is the coeditor of *Endangered Species Act: Law, Policy, and Perspectives* (3rd ed, 2021).

ESA symposium, Jan. 31, 2023 1-5 pm est

Heritage Program

The Mississippi Natural Heritage Program (MNHP) identifies and maps in a spatial database (Biotics) the localities of Mississippi's rarest plants, animals, exemplary natural communities, and special geological features. This database is updated continuously and utilized to portray the distribution of each species, to determine its degree of rarity, and assist with development of state, national, and global priorities for the preservation of natural diversity.

State-endangered Green Salamander guarding her eggs that can be seen clinging to the wall above her. Photo credit: Tom Mann

The MNHP, established in 1976 as a cooperative agreement between The Nature Conservancy and the Mississippi Parks Commission, is part of an international network of State Natural Heritage Programs and Conservation Data Centers, all building on the same data collection methodology. Full administration of the MNHP was assumed by

- Obtain status and location of rare organisms, communities
- Maintain information in Biotics Database
- Facilitate conservation
- Manage and promote Natural Areas Registry and Scenic Streams Stewardship Programs

MS Natural Heritage Program

99 species of concern state level;

56 species of concern federal level

MISSISSIPPI NATURAL HERITAGE PROGRAM

LISTED SPECIES OF MISSISSIPPI

- 2018 -

SPECIES NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
ANIMALIA					
BIVALVIA					
UNIONOIDA					
UNIONIDAE					
ACTINONAIAS LIGAMENTINA	MUCKET	G5	S1		LE
CYCLONAIAS TUBERCULATA	PURPLE WARTYBACK	G5	S1		LE
ELLIPTIO ARCTATA	DELICATE SPIKE	G2G3Q	S1		LE
EPIOBLASMA BREVIDENS	CUMBERLANDIAN COMBSHELL	G1	S1	LE	LE
EPIOBLASMA PENITA	SOUTHERN COMBSHELL	G1	S1	LE	LE
EPIOBLASMA TRIQUETRA	SNUFFBOX	G3	S1	LE	LE
EURYNIA DILATATA	SPIKE	G5	S1		LE
HAMIOTA PEROVALIS	ORANGE-NACRE MUCKET	G2	S1	LT	LE
MEDIONIDUS ACUTISSIMUS	ALABAMA MOCCASINSHELL	G2	S1	LT	LE
PLETHOBASUS CYPHYUS	SHEEPNOSE	G3	S1	LE	LE
PLEUROBEMA CURTUM	BLACK CLUBSHELL	GH	SX	LE	LE
PLEUROBEMA DECISUM	SOUTHERN CLUBSHELL	G2	S1	LE	LE
PLEUROBEMA MARSHALLI	FLAT PIGTOE	GX	SX	LE	LE
PLEUROBEMA OVIFORME	TENNESSEE CLUBSHELL	G2G3	SX		LE
PLEUROBEMA PEROVATUM	OVATE CLUBSHELL	G1	S1	LE	LE
PLEUROBEMA RUBRUM	PYRAMID PIGTOE	G2G3	S2		LE
PLEUROBEMA TAITIANUM	HEAVY PIGTOE	G1	SX	LE	LE
PLEURONAIA DOLABELLOIDES	SLABSIDE PEARLYMUSSEL	G2	S1	LE	LE
POTAMILUS CAPAX	FAT POCKETBOOK	G2	S1	LE	LE
POTAMILUS INFLATUS	INFLATED HEELSPLITTER	G1G2Q	SH	LT	LE
PTYCHOBRANCHUS FASCIOLARIS	KIDNEYSHELL	G4G5	S1		LE
THELIDERMA CYLINDRICA CYLINDRICA	RABBITSFOOT	G3G4T3	S1	LT	LE
THELIDERMA METANEVRA	MONKEYFACE	G4	SX		LE
THELIDERMA STAPES	STIRRUPSHELL	GH	SX	LE	LE
MALACOSTRACA					
DECAPODA					
CAMBARIDAE					
CREASERINUS GORDONI	CAMP SHELBY BURROWING CRAWFISH	G1	S1		LE
INSECTA					
COLEOPTERA					
SILPHIDAE					
NICROPHORUS AMERICANUS	AMERICAN BURYING BEETLE	G2G3	SX	LE	LE
LEPIDOPTERA					
NYMPHALIDAE					
NEONYMPHA MITCHELLII MITCHELLII	MITCHELL'S SATYR	G2T2	S1	LE	LE

Cite the list as:
Mississippi Natural Heritage Program, 2018. Listed Species of Mississippi. Museum of Natural Science, Mississippi Dept. of Wildlife, Fisheries, and Parks, Jackson, MS. 6 pp.

SPECIES NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
TESTUDINES					
CHELONIIDAE					
CARETTA CARETTA	LOGGERHEAD SEA TURTLE	G3	S1B,SNA	LT	LE
CHELONIA MYDAS	GREEN SEA TURTLE	G3	SNA	LT	LE
ERETMOCHELYS IMBRICATA	HAWKSBILL SEA TURTLE	G3	SNA	LE	LE
LEPIDOCHELYS KEMPII	KEMP'S RIDLEY SEA TURTLE	G1	S1B,S1N	LE	LE
DERMOCHELYIDAE					
DERMOCHELYS CORIACEA	LEATHERBACK SEA TURTLE	G2	SNA	LE	LE
EMYDIDAE					
GRAPTEMYS FLAVIMACULATA	YELLOW-BLOTCHED MAP TURTLE	G2	S2	LT	LE
GRAPTEMYS NIGRINODA	BLACK-KNOBBED MAP TURTLE	G3	S2		LE
GRAPTEMYS OCULIFERA	RINGED MAP TURTLE	G2	S2	LT	LE
PSEUDEMYS ALABAMENSIS	ALABAMA RED-BELLIED TURTLE	G1	S1	LE	LE
TESTUDINIDAE					
GOPHERUS POLYPHEMUS	GOPHER TORTOISE	G3	S2	LT	LE
AVES					
CHARADRIIFORMES					
CHARADRIIDAE					
CHARADRIUS MELODUS	PIPING PLOVER	G3	S2N	LT	LE
CHARADRIUS NIVOSUS	SNOWY PLOVER	G3	S2	PS:LT	LE
LARIDAE					
STERNULA ANTILLARUM	LEAST TERN	G4	S3B,S3N	PS:LE	
STERNULA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	G4T2Q	S2B	PS:LE	LE
RECURVIROSTRIDAE					
HIMANTOPUS MEXICANUS	BLACK-NECKED STILT	G5	S1B	PS	
SCOLOPACIDAE					
CALIDRIS CANUTUS	RED KNOT	G5	S2N	LT	
CICONIIFORMES					
CICONIIIDAE					
MYCTERIA AMERICANA	WOOD STORK	G4	S2N	LT	LE
COLUMBIFORMES					
ACCITRIPIFORMES					
ACCIPITRIDAE					
ACCIPITER STRIATUS	SHARP-SHINNED HAWK	G5	S1?B	PS	
ELANOIDES FORFICATUS	SWALLOW-TAILED KITE	G5	S2B		LE
FALCONIFORMES					
FALCONIDAE					
FALCO PEREGRINUS	PEREGRINE FALCON	G4	S1N		LE
GALLIFORMES					
ODONTOPHORIDAE					
COLINUS VIRGINIANUS	NORTHERN BOBWHITE	G4G5	S3S4	PS	
GRUIFORMES					
GRUIDAE					
GRUS CANADENSIS PULLA	MISSISSIPPI SANDHILL CRANE	G5T1	S1	LE	LE
PASSERIFORMES					
EMBERIZIDAE					
AMMODRAMUS MARITIMUS	SEASIDE SPARROW	G4	S2	PS	
AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW	G5	S3B,S3N	PS	

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#22 Great hammerhead (*Sphyrna mokarran*) (c) Shutterstock

Federal Register V. 87, No.217, pages 67451-67457

Background

On June 16, 2022, we received a petition from the Center for Biological Diversity (CBD) to list the great hammerhead shark as a threatened or endangered species under the ESA and to designate critical habitat concurrent with the listing. We have previously reviewed the status of the great hammerhead shark for listing under the ESA as a result of two petitions received in 2012 and 2013. We completed a comprehensive status review of the great hammerhead shark in response to these petitions, and based on the best scientific and commercial information available, including the status review report (Miller *et al.* 2014), we determined that the species was not comprised of distinct population segments (DPSs), was not currently in danger of extinction throughout all or a significant portion of its range, and was not likely to become so within the foreseeable future. Therefore, on June 11, 2014, we published a final determination, the 12-month finding, that the great hammerhead shark did not warrant ESA listing (79 FR 33509).

Petition Finding

We thoroughly reviewed the information presented in the petition, in context of information readily available in our files, and found that it does not provide any credible new information regarding great hammerhead sharks or otherwise offer substantial information not already considered in our status review report of the great hammerhead shark (Miller *et al.* 2014) and 12-month finding (79 FR 33509, June 11, 2014). As such, we find that the petition does not present substantial scientific or commercial information indicating that the petitioned action may be warranted.

U.S. Fish & Wildlife Service
ECOS

ECOS / Species Reports / Listed Species Summary (Boxscore)

Listed Species Summary (Boxscore)

Summary of Listed Species Listed Populations[1] and Recovery Plans[2] as of Wed, 02 Nov 2022 19:42:27 GMT

Group	United States [3]			Foreign			Total Listings (US and Foreign)	US Listings with active Recovery Plans[2]
	Endangered	Threatened	Total Listings	Endangered	Threatened	Total Listings		
Amphibians	23	16	39	8	1	9	48	27
Annelid Worms	0	0	0	0	0	0	0	0
Arachnids	11	0	11	5	0	5	16	11
Birds	76	23	99	217	22	239	338	91
Clams	77	16	93	2	0	2	95	75
Corals	0	7	7	3	15	18	25	0
Crustaceans	25	5	30	0	0	0	30	22
Fishes	94	76	170	27	9	36	206	106
Flatworms and Roundworms	0	0	0	0	0	0	0	0
Hydroids	0	0	0	0	0	0	0	0
Insects	75	15	90	4	0	4	94	64
Mammals	66	30	96	261	23	284	380	63
Millipedes	0	0	0	0	0	0	0	0
Reptiles	17	29	46	70	24	94	140	40
Snails	38	13	51	1	1	2	53	39
Sponges	0	0	0	0	0	0	0	0
Animal Totals	**502**	**230**	**732**	**598**	**95**	**693**	**1425**	**538**
Plant Totals	**768**	**172**	**940**	**1**	**2**	**3**	**943**	**809**
Grand Totals	**1270**	**402**	**1672**	**599**	**97**	**696**	**2368**	**1347**

1270 482 1672

[1] A listing has an E or a T in the "status" column of the tables in 50 CFR 17.11(h) or 50 CFR 17.12(h) (the "List of Endangered and Threatened Wildlife and Plants"). *Note: Listings with status "Similarity of Appearance" are not included in the totals.*

22 animal species (14 in the U.S.[3] and 8 Foreign) are counted more than once in the above table, primarily because these animals have distinct population segments (each with its own individual listing status).

The U.S. species counted more than once are:

- Frog, mountain yellow-legged (Rana muscosa)
- Plover, piping (Charadrius melodus)
- Salamander, California tiger (Ambystoma californiense)
- Salmon, Chinook (Oncorhynchus (=Salmo) tshawytscha)
- Salmon, chum (Oncorhynchus keta)
- Salmon, coho (Oncorhynchus (=Salmo) kisutch)
- Salmon, sockeye (Oncorhynchus (=Salmo) nerka)
- Seal, bearded (Erignathus barbatus nauticus)
- Sea turtle, green (Chelonia mydas)
- Sea turtle, loggerhead (Caretta caretta)
- Steelhead (Oncorhynchus (=Salmo) mykiss)
- Sturgeon, Atlantic (Acipenser oxyrinchus oxyrinchus)
- Tern, roseate (Sterna dougallii dougallii)
- Wolf, gray (Canis lupus)

The foreign species counted more than once are:

- Argali (Ovis ammon)
- Caiman, broad-snouted (Caiman latirostris)
- Leopard (Panthera pardus)
- Sea turtle, green (Chelonia mydas)
- Sea turtle, loggerhead (Caretta caretta)
- Shark, Scalloped Hammerhead (Sphyrna lewini)
- Vicuna (Vicugna vicugna)
- Whale, humpback (Megaptera novaeangliae)

[2] There are a total of 643 distinct active (Draft and Final) recovery plans. Some recovery plans cover more than one species, and a few species have separate plans covering different parts of their ranges. This count includes only plans generated by the USFWS (or jointly by the USFWS and NMFS), and only listed species that occur in

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"This discovery shows us how much more there is to learn even in our own backyards," lead author R. Alexander Pyron said in a news release.

BY DENNIS PILLION
MAY 5, 2022

A new species of swamp-dwelling salamander has been discovered in the south Alabama region called "America's Amazon," adding another name to the impressive list of amphibian species living there.

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The Megachile pluto is about four times the size of a honeybee.

By Stephen Johnson
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The Eastern indigo snake is a large non-venomous snake native to the Eastern United States.

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