Herbicide Best Management Practices for Water Quality Protection

Minnesota Department of Agriculture

Best Management Practices (BMPs) for Agricultural Pesticides to protect:

- Surface Water
- Groundwater
- Sensitive Areas


Water Quality **Best Management Practices for All AGRICULTURAL INSECTICIDES**

July, 2014

In order to protect Minnesota's water resources, the Minnesota Department of Agriculture (MDA), in cooperation with the University of Minnesota Extension Service and other interested parties, developed a set of core Best Management Practices (BMPs). These core voluntary BMPs should be adopted when applying agricultural insecticides in Minnesota. The BMPs may also refer to mandatory label use requirements. Always read and follow product labels. Sources of additional information are listed in these BMPs.

Insecticides are designed to control target insect pests. Non-target insects, fish, and other wildlife can be exposed to insecticides lost from fields by surface runoff, drift, volatilization, or leaching. Applicators are required to control potential impacts by carefully following label instructions, including use of mandatory application setbacks from water bodies. Impacts to aquatic organisms can be further managed through adoption of voluntary BMPs. The MDA has also developed BMPs (published separately) for use with specific crop insecticides.

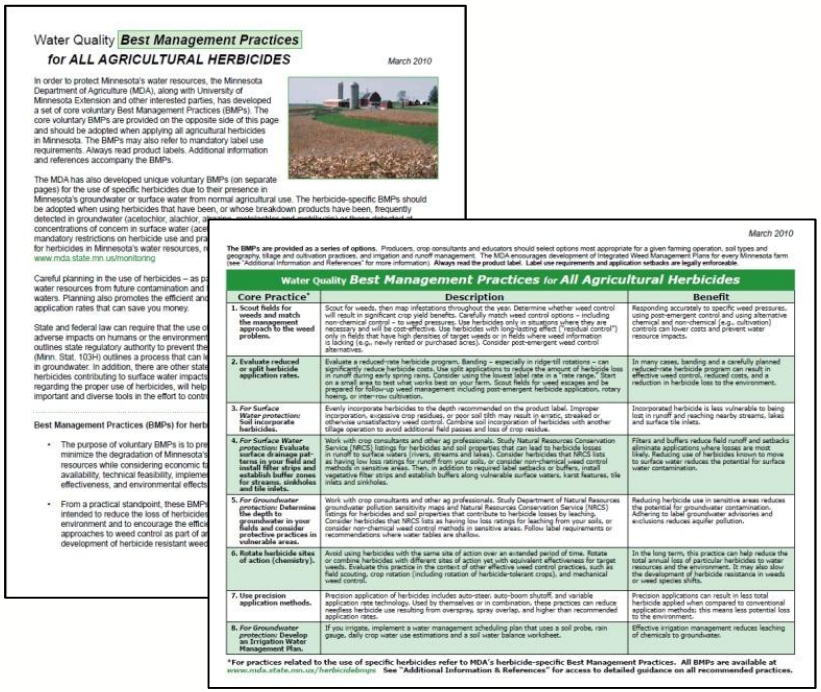
Careful and prudent insecticide use, as part of an Integrated Pest Management plan, can help protect water resources from future contamination and reduce levels of insecticides found in Minnesota's waters. Planning also promotes the efficient and economical use of insecticides which may improve efficacy, increase yields, result in reduced application rates, and reduce production costs.

State and federal law can require that the use of an insecticide be limited due to the potential for adverse impacts on humans or the environment. The Minnesota Pesticide Control Law (Minn. Stat. 18B) specifies state regulatory authority to prevent these impacts. The Clean Water Act outlines a process that can lead to greater oversight of insecticide use in certain watersheds. Adopting BMPs and using pesticides properly will help growers maintain access to a variety of insecticides as important and diverse tools in the effort to control insect pests and protect water resources. For information on monitoring results for a variety of insecticides in Minnesota's water resources, refer to the MDA's Monitoring and Assessment

Integrated Pest Management (IPM)
Reducing crop losses by integrating multiple tactics (e.g., cultural, chemical, biological and mechanical) in ways that favor the crop and suppress insect

Water Quality BMPs include:

- Mandatory Label Requirements
- Optional Voluntary Pesticide Practices



Water Quality **Best Management Practices for ALL AGRICULTURAL HERBICIDES**

March 2010

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The MDA has also developed unique voluntary BMPs (on separate pages) for the use of specific herbicides due to their presence in Minnesota's groundwater or surface water from normal agricultural use. The herbicide-specific BMPs should be adopted when using herbicides that have been, or whose breakdown products have been, frequently detected in groundwater (acetochlor, alachlor, a… concentrations of concern in surface water (ace… mandatory restrictions on herbicide use and pra… for herbicides in Minnesota's water resources, h… www.mda.state.mn.us/monitoring

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March 2010

The BMPs are provided as a series of options. Producers, crop consultants and educators should select options most appropriate for a given farming operation, soil types and geography, tillage and cultivation practices, and irrigation and runoff management. The MDA encourages development of Integrated Weed Management Plans for every Minnesota farm (see "Additional Information and References" for more information). **Always read the product label. Label use requirements and application setbacks are legally enforceable.**

Water Quality *Best Management Practices for All Agricultural Herbicides*

Core Practice*	Description	Benefit
1. Scout fields for weeds and match the management approach to the weed problem.	Scout for weeds, then map infestations throughout the year. Determine whether weed control will result in significant crop yield benefits. Carefully match weed control options – including non-chemical control – to weed pressures. Use herbicides only in situations where they are necessary and will be cost-effective. Use herbicides with long-lasting effect ("residual control") only in fields that have high densities of target weeds or in fields where weed information is lacking (e.g., newly rented or purchased acres). Consider post-emergent weed control alternatives.	Responding accurately to specific weed pressures, using post-emergent control and using alternative chemical and non-chemical (e.g., cultivation) controls can lower costs and prevent water resource impacts.
2. Evaluate reduced or split herbicide application rates.	Evaluate a reduced-rate herbicide program. Banding – especially in ridge-till rotations – can significantly reduce herbicide costs. Use split applications to reduce the amount of herbicide loss in runoff during early spring rains. Consider using the lowest label rate in a "rate range." Start on a small area to test what works best on your farm. Scout fields for weed escapes and be prepared for follow-up weed management including post-emergent herbicide application, rotary hoeing, or inter-row cultivation.	In many cases, banding and a carefully planned reduced-rate herbicide program can result in effective weed control, reduced costs, and a reduction in herbicide loss to the environment.
3. *For Surface Water protection:* Soil incorporate herbicides.	Evenly incorporate herbicides to the depth recommended on the product label. Improper incorporation, excessive crop residues, or poor soil tilth may result in erratic, streaked or otherwise unsatisfactory weed control. Combine soil incorporation of herbicides with another tillage operation to avoid additional field passes and loss of crop residue.	Incorporated herbicide is less vulnerable to being lost in runoff and reaching nearby streams, lakes and surface tile inlets.
4. *For Surface Water protection:* Evaluate surface drainage patterns in your field and install filter strips and establish buffer zones for streams, sinkholes and tile inlets.	Work with crop consultants and other ag professionals. Study Natural Resources Conservation Service (NRCS) listings for herbicides and soil properties that can lead to herbicide losses in runoff to surface waters (rivers, streams and lakes). Consider herbicides that NRCS lists as having low loss ratings for runoff from your soils, or consider non-chemical weed control methods in sensitive areas. Then, in addition to required label setbacks or buffers, install vegetative filter strips and establish buffers along vulnerable surface waters, karst features, tile inlets and sinkholes.	Filters and buffers reduce field runoff and setbacks eliminate applications where losses are most likely. Reducing use of herbicides known to move to surface water reduces the potential for surface water contamination.
5. *For Groundwater protection:* Determine the depth to groundwater in your fields and consider protective practices in vulnerable areas.	Work with crop consultants and other ag professionals. Study Department of Natural Resources groundwater pollution sensitivity maps and Natural Resources Conservation Service (NRCS) listings for herbicides and soil properties that contribute to herbicide losses by leaching. Consider herbicides that NRCS lists as having low loss ratings for leaching from your soils, or consider non-chemical weed control methods in sensitive areas. Follow label requirements or recommendations where water tables are shallow.	Reducing herbicide use in sensitive areas reduces the potential for groundwater contamination. Adhering to label groundwater advisories and exclusions reduces aquifer pollution.
6. Rotate herbicide sites of action (chemistry).	Avoid using herbicides with the same site of action over an extended period of time. Rotate or combine herbicides with different sites of action yet with equivalent effectiveness for target weeds. Evaluate this practice in the context of other effective weed control practices, such as field scouting, crop rotation (including rotation of herbicide-tolerant crops), and mechanical weed control.	In the long term, this practice can help reduce the total annual loss of particular herbicides to water resources and the environment. It may also slow the development of herbicide resistance in weeds or weed species shifts.
7. Use precision application methods.	Precision application of herbicides includes auto-steer, auto-boom shutoff, and variable application rate technology. Used by themselves or in combination, these practices can reduce needless herbicide use resulting from overspray, spray overlap, and higher than recommended application rates.	Precision applications can result in less total herbicide applied when compared to conventional application methods; this means less potential loss to the environment.
8. *For Groundwater protection:* Develop an Irrigation Water Management Plan.	If you irrigate, implement a water management scheduling plan that uses a soil probe, rain gauge, daily crop water use estimations and a soil water balance worksheet.	Effective irrigation management reduces leaching of chemicals to groundwater.

*For practices related to the use of specific herbicides refer to MDA's herbicide-specific Best Management Practices. All BMPs are available at www.mda.state.mn.us/herbicidebmps See "Additional Information & References" for access to detailed guidance on all recommended practices.

Acetochlor

- Chloroacetamide Herbicide
- Preemergence herbicide.
- Controls annual grasses, yellow nutsedge, and some annual broadleaves (*Amaranthus spp.*)

Minnesota Department of Agriculture

Acetochlor

- Inhibits seedling shoot growth – VLCFA synthesis inhibitor, Site of Action 15
- Registered by a number of companies and sold under trade names such as:

WARRANT HERBICIDE

HARNESS®

Surpass® EC HERBICIDE

Acetochlor Detection

- Groundwater - see label for restrictions.
- Surface Water – has been found at “concentrations of concern”.

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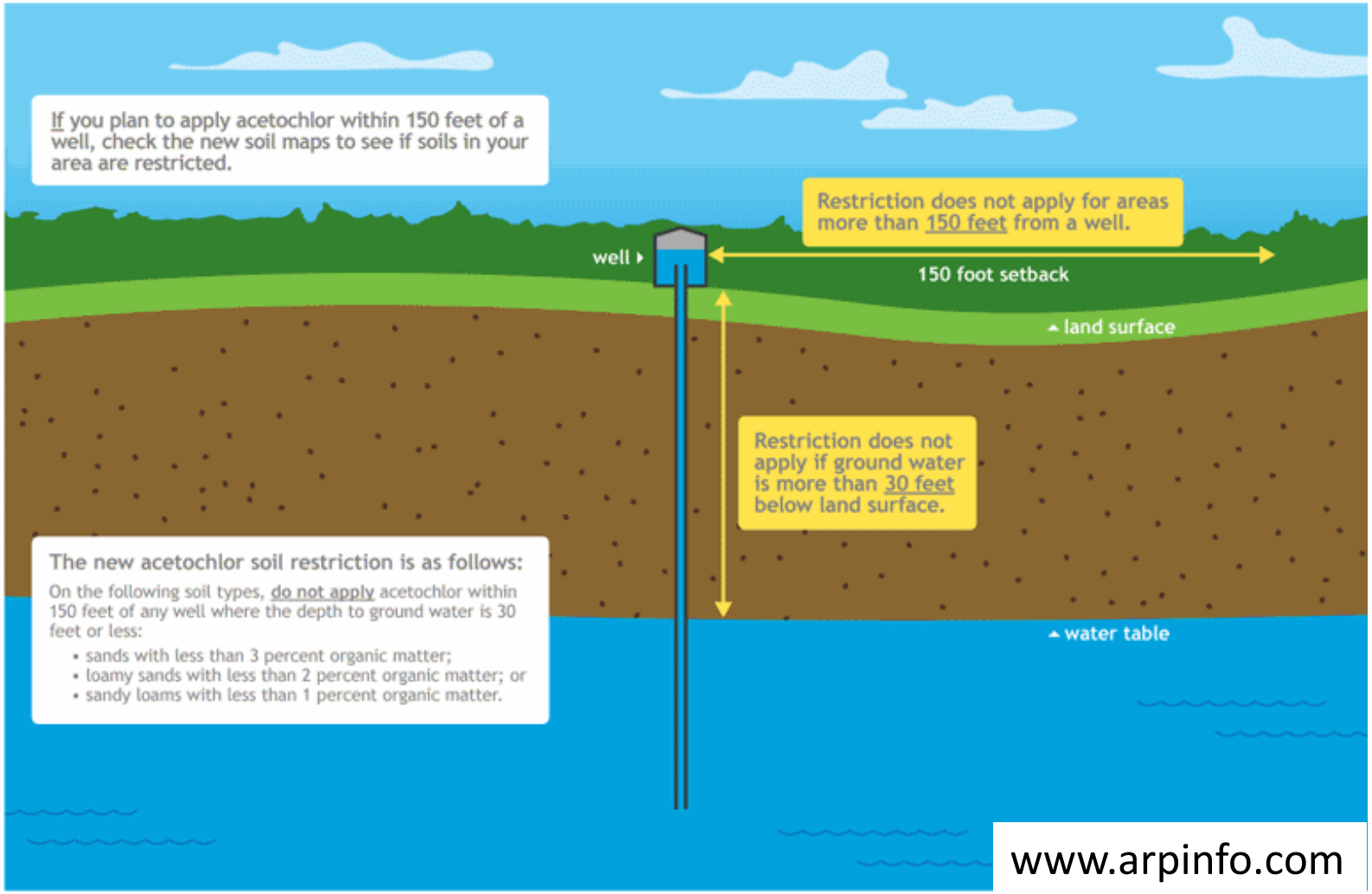
Acetochlor Application Restriction



www.arpinfo.com

Acetochlor Application Restrictions

- Applies only if depth to ground water is 30’ or less.

- And -

- Soil types are:
  - sands with less than 3% organic matter
  - loamy sands with less than 2% organic matter
  - sandy loams with less than 1% organic matter

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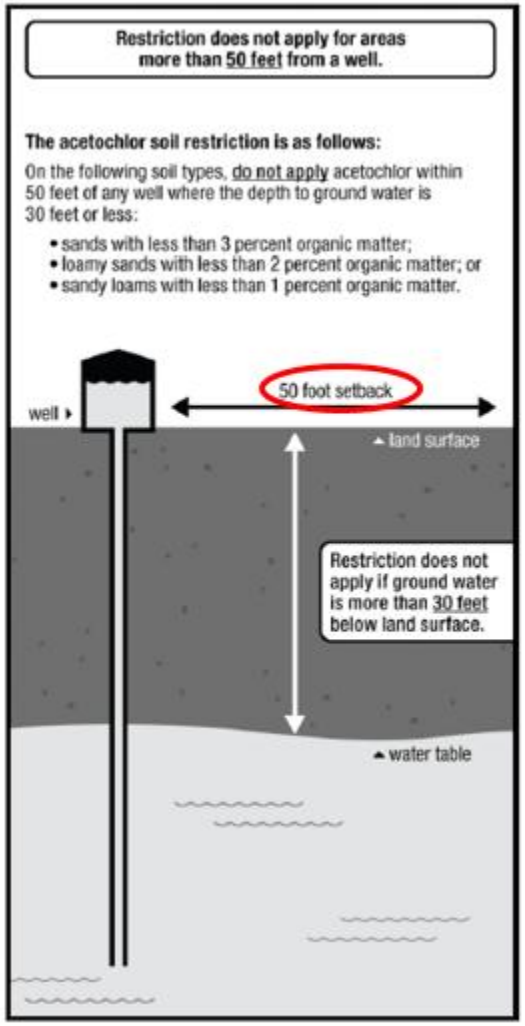
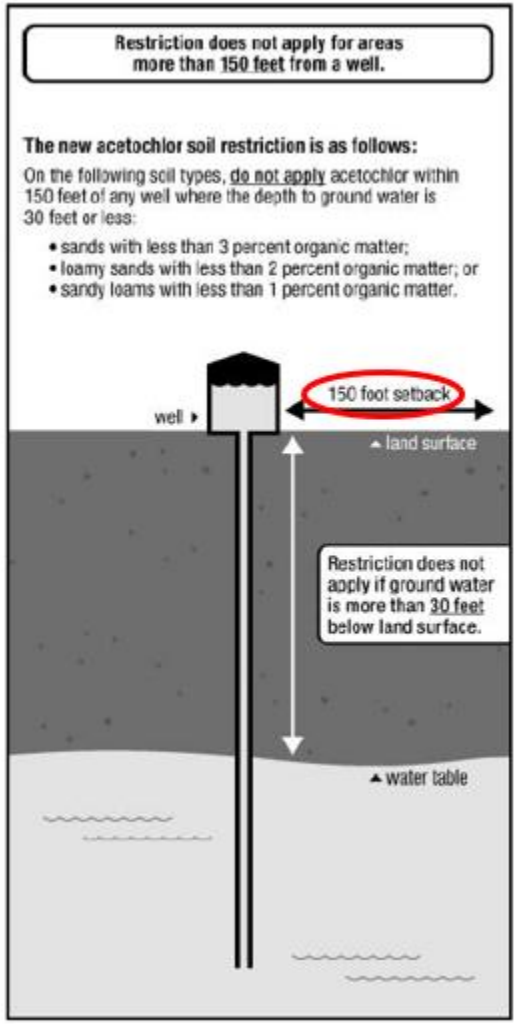
Closer view of label restrictions.





Acetochlor Application Restrictions

Variations among Acetochlor Labels:

- 50 ft -vs - 150 ft Setback

- Some acetochlor products do **not** allow application on listed soil types regardless of the presence of a well.

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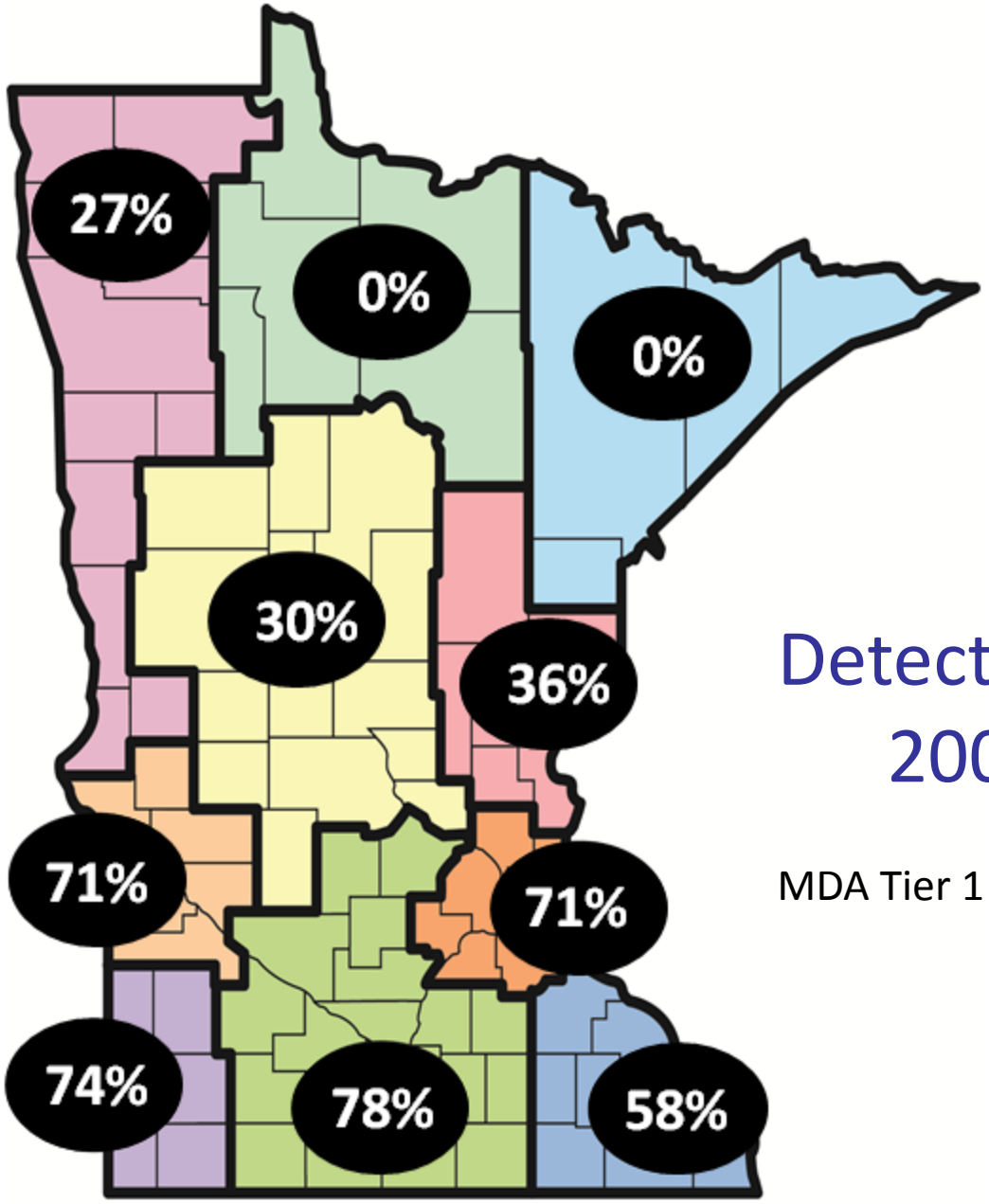
Acetochlor Restrictions

Acetochlor Mixing/Loading

Do Not **Mix/Load** within 50 feet of:

- Wells
- Streams & Rivers – perennial or intermittent
- Lakes & Reservoirs



Acetochlor in surface water

Detection frequency: 2009 – 2014 average

MDA Tier 1 & 2 monitoring locations

Acetochlor Use Recommendations

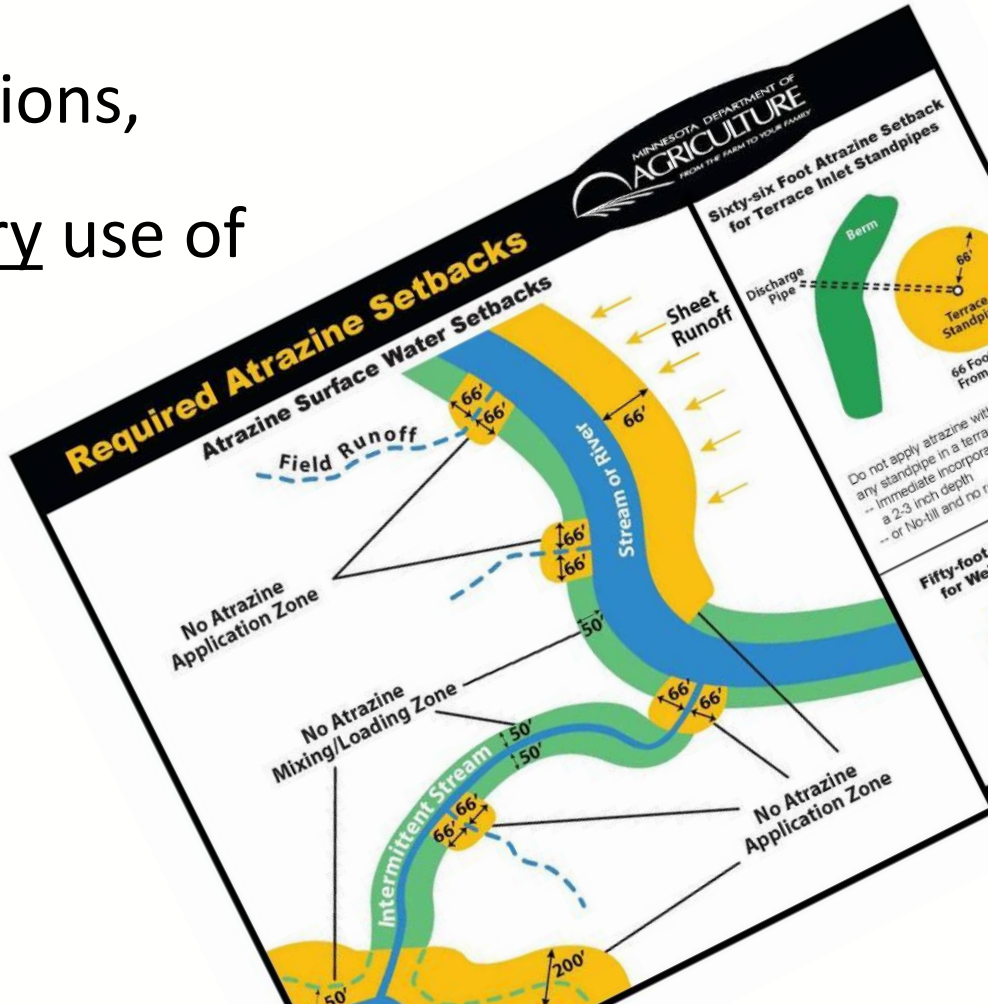
In addition to Label Restrictions,

MDA recommends Voluntary use of

Atrazine Setbacks to

further protect

Surface and Groundwater.



Acetochlor Use Recommendations

2009 presentation - Reduction of Atrazine and Acetochlor Field Losses

Link is on current webpage

or

www.mda.state.mn.us/Global/MDADocs/protecting/bmps/pesticideuse-waterquality2009-08-14.aspx

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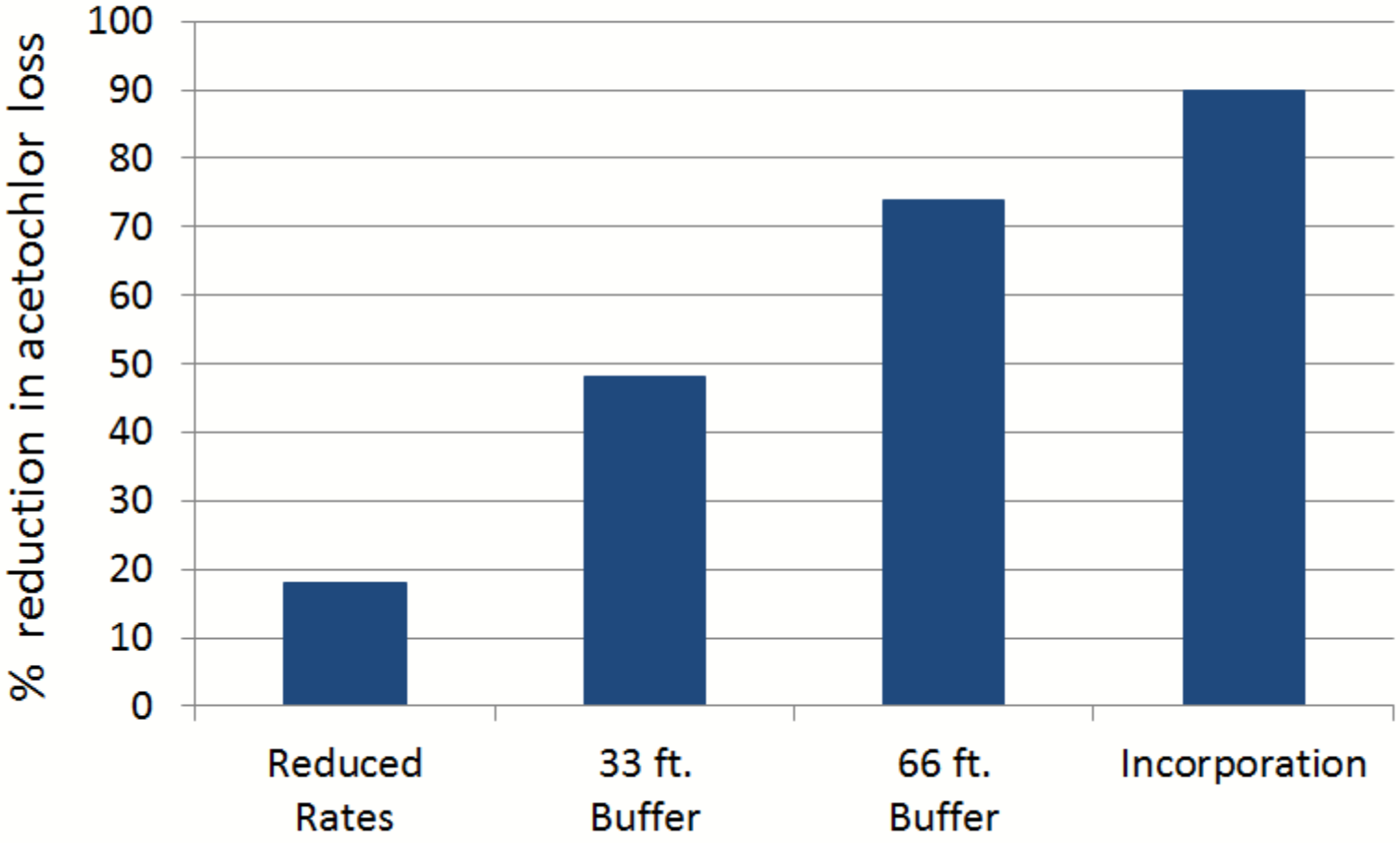
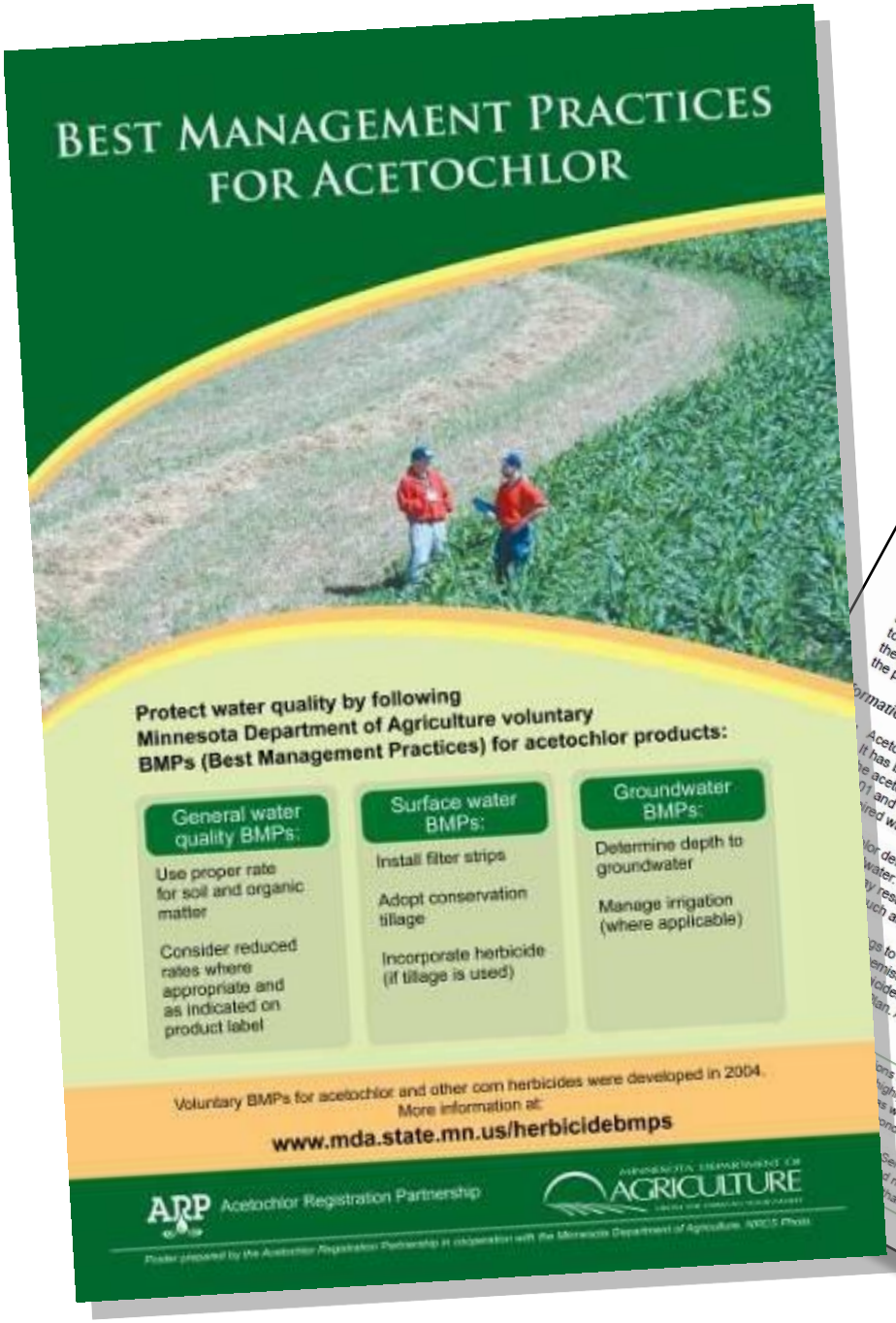
Effect of Practices on Acetochlor Loss

UM Computer Modeling of Beauford Watershed



Acetochlor BMP and Poster



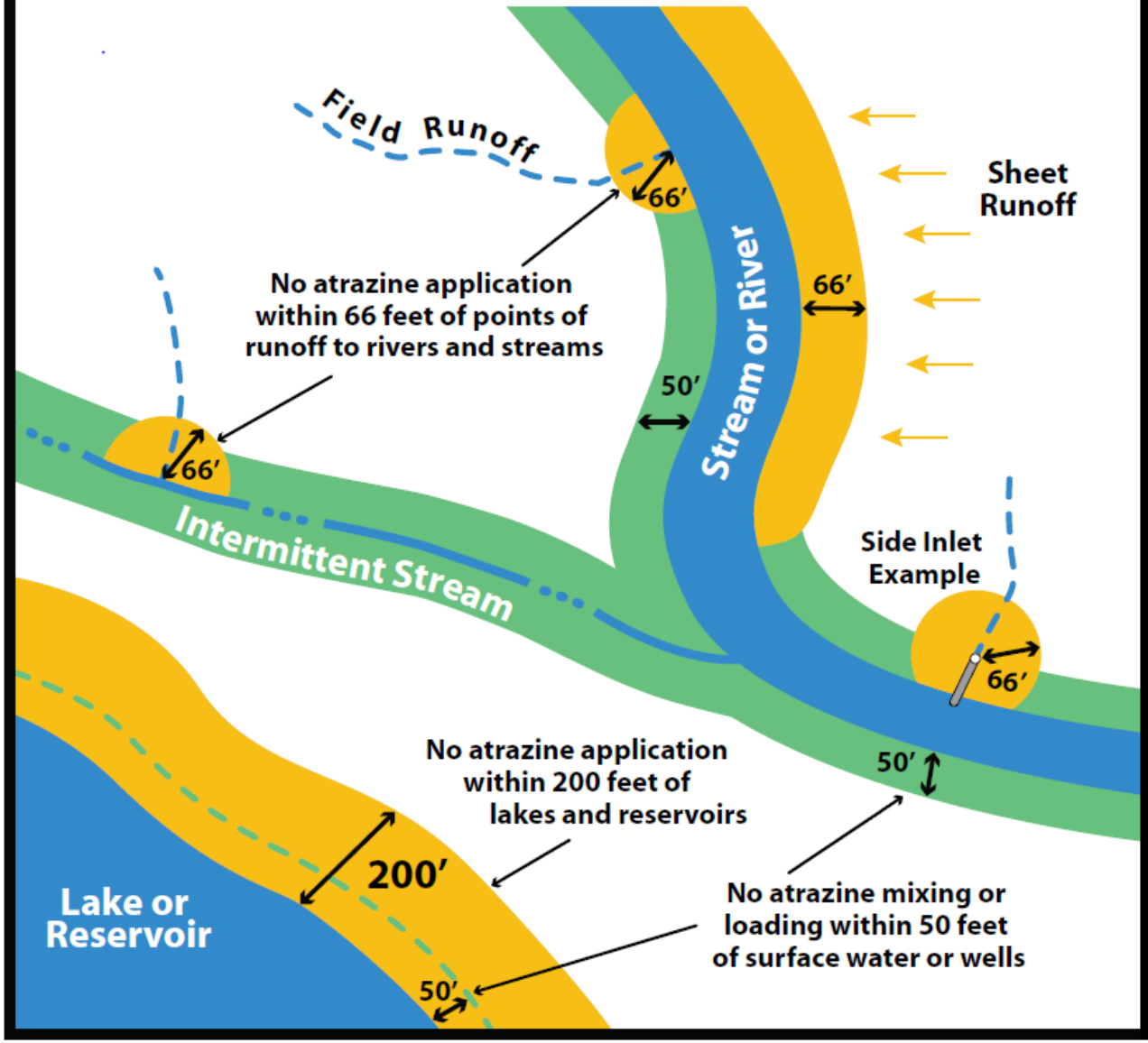
Atrazine

- Second most used pesticide based on acres applied.
- Registered in 1958.
- Aquatic life standard of 10 ppb over 4 days.
- Label restrictions for surface water and groundwater protection since 1992.

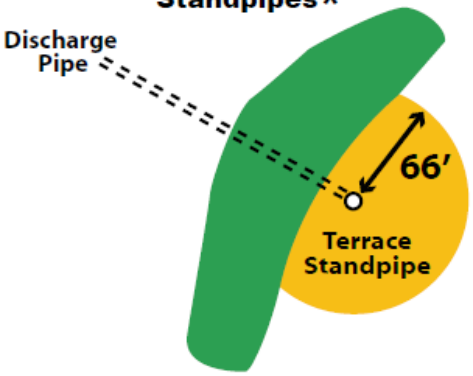
Required Atrazine Product Setbacks

MINNESOTA DEPARTMENT OF AGRICULTURE

Surface Water Setbacks for Atrazine Products



Sixty-six Foot Atrazine Product Setback for Terrace Inlet Standpipes*



Do not apply atrazine within 66 feet of any standpipe in a terraced field unless:
-- Immediate incorporation to a 2-3 inch depth
-- or No-till is used with no residue removal

* Atrazine products vary on this requirement. Follow label of product being used.

Fifty-foot Atrazine Product Setback for Wells and Sinkholes

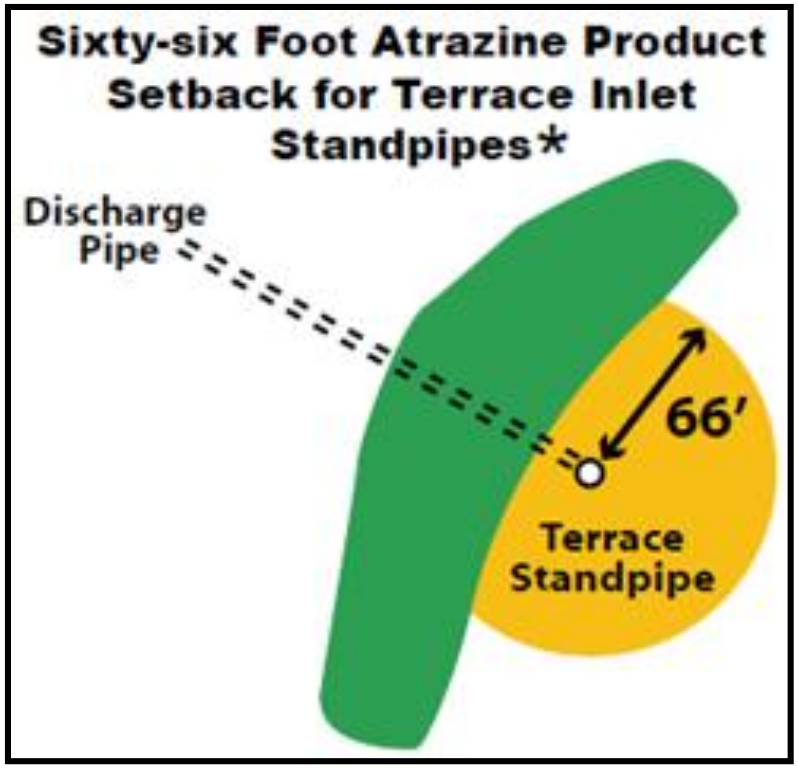
Applies to all wells; including drinking water, irrigation, drainage, and abandoned wells

READ THE LABEL!

February 2011

Minnesota Department of Agriculture

Atrazine setbacks from standpipes

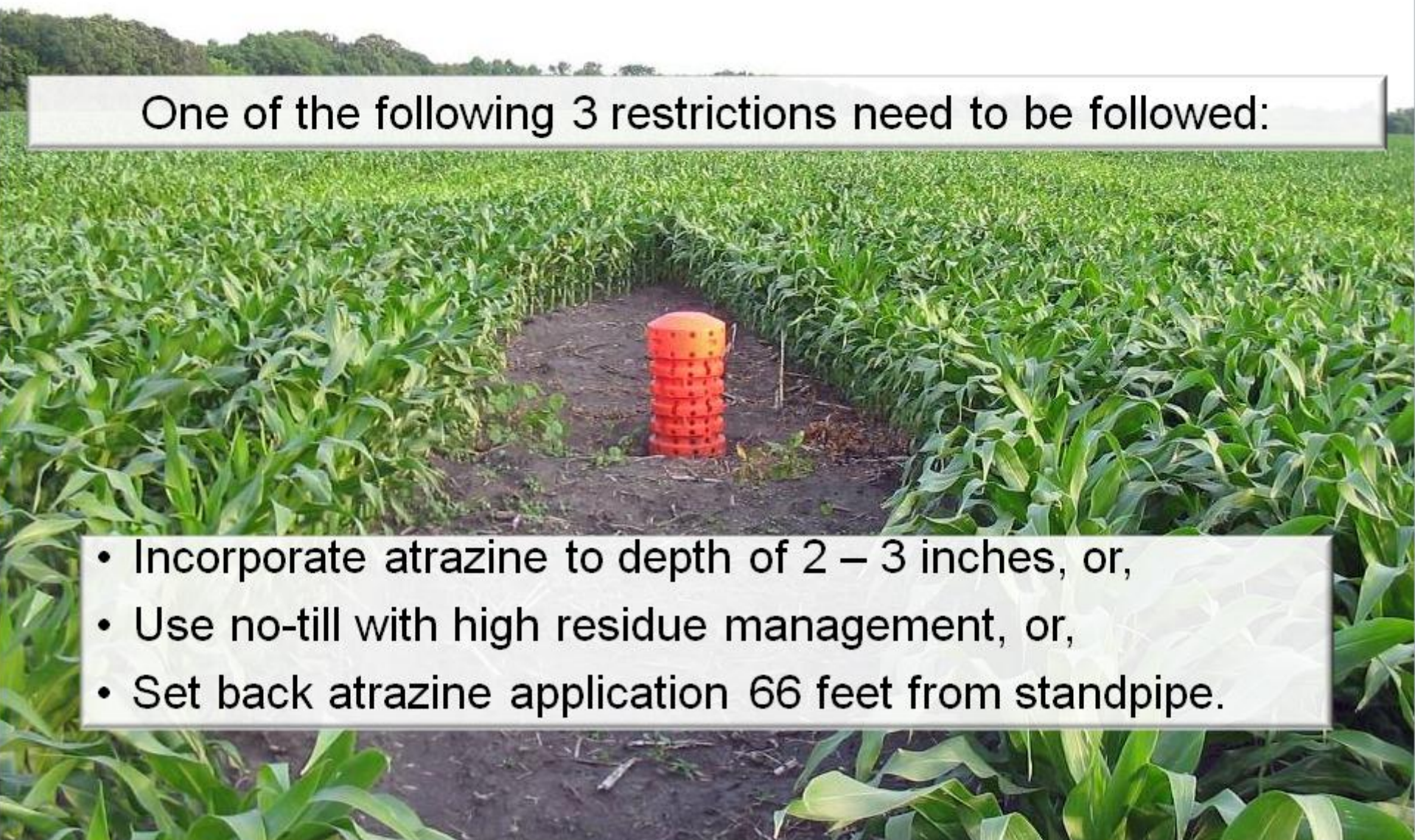


Atrazine setbacks from standpipes in tile-outletted terraced fields

Atrazine setbacks from standpipes in tile-outletted ~~terraced~~ fields

Some labels have surface tile inlet restrictions for all fields.

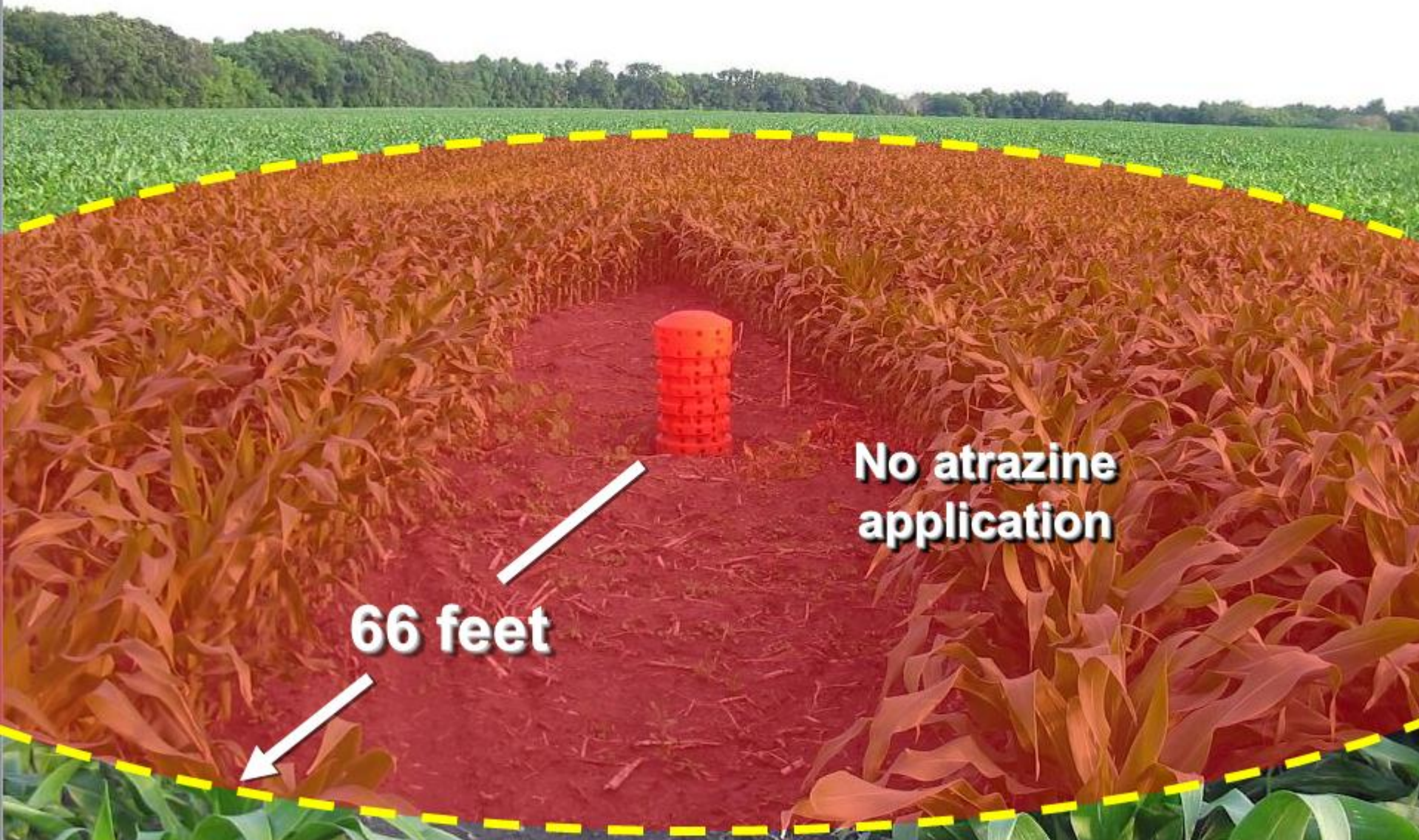
Atrazine setbacks from standpipes in tile-outletted fields



One of the following 3 restrictions need to be followed:

- Incorporate atrazine to depth of 2 – 3 inches, or,
- Use no-till with high residue management, or,
- Set back atrazine application 66 feet from standpipe.

Atrazine setbacks from standpipes



Atrazine Recommendations

More information on:

- Required Atrazine Setbacks
- MDA Water Quality BMPs

See MDA Website:

www.mda.state.mn.us/Global/MDADocs/protecting/bmps/pesticideuse-waterquality2009-08-14.aspx

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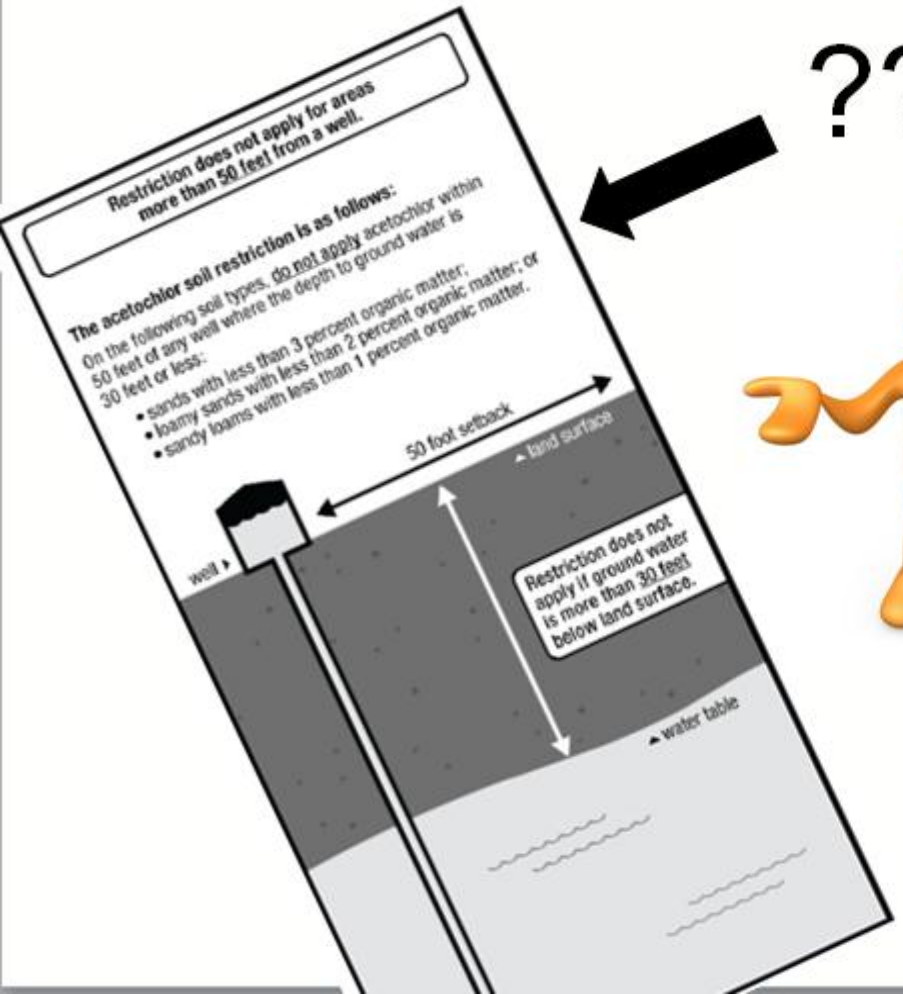
Acetochlor + Atrazine Tank Mix



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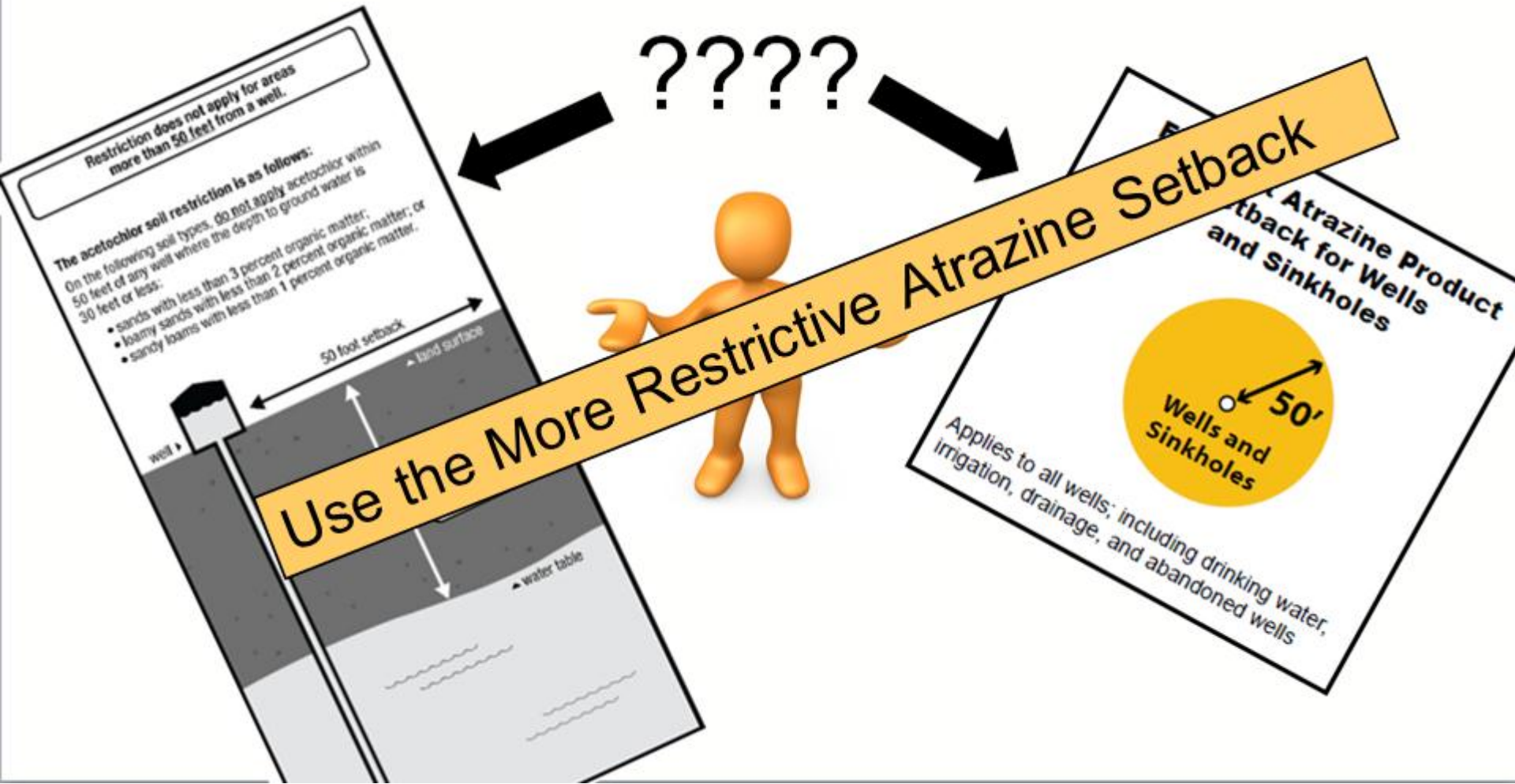


Other MDA Best Management Practices

All Agricultural Herbicides

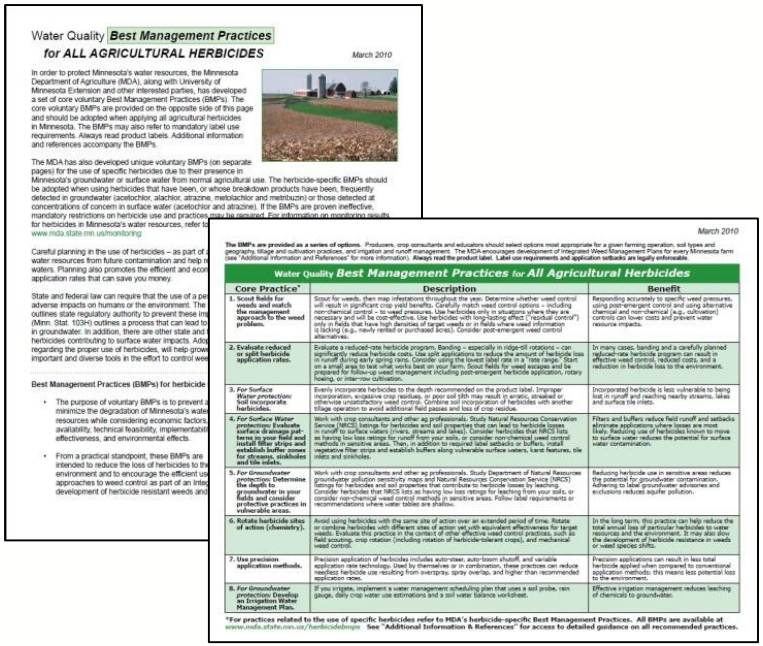
Acetochlor

Alachlor

Atrazine

Metolachlor

Metribuzin



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Minnesota Department of Agriculture

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