Healthy soil structure builds crop resilience to weather extremes

Permanent no-till allows soil microbes to build soil aggregates while earthworms and dead roots create drainage channels to help with infiltration and drainage during heavy downpours. No-till reduces fuel use by 5.7 gal/ac, labor by 2.75 hr/ac, a $50 savings/ac.

Soil organic matter (SOM) is an essential tool for providing water to crops during dry spells. No-till and cover crops build SOM. During the 2012 drought, corn and soybean fields with 5 consecutive years of cover crops had 10% greater yields than fields without.

PA farmers moving ahead


Funding opportunities

Environmental Quality Incentives Program (EQIP)
offers financial and technical assistance to implement conservation practices such as grazing improvements, no-till, cover crops, forest stewardship, and on-farm energy conservation. Learn more at https://www.nrcs.usda.gov/wps/portal/nrcs/main/pa/programs/financial/equip/ or talk to your NRCS district office.

Resource Enhancement & Protection Program (REAP)
offers tax credits for implementing best management practices like rotational grazing systems, no-till planting equipment, and cover crops. Learn more at https://www.agriculture.pa.gov/Plants_Land_Water/StateConservationCommission/REAP or talk to your county conservation district office.

For a current list of grant opportunities in PA visit:

Local folks who want to help you build resilience

Indiana County Conservation District - 724-471-4751
435 Hamill Road, Indiana PA 15701
Indiana County NRCS - 724-427-3324
Penn State U. Extension Indiana County - 724-465-3880

This brochure was produced by the Shenango River Valley Climate and Rural Systems Partnership (CRSP) with input from local farmers, extension educators, NRCS, the Carnegie Museum of Natural History, the Mercer County Conservation District, and Indiana County Conservation District. CRSP is supported by National Science Foundation awards #1906774 and #1906368. Illustrations by Bonnie McGill. We welcome your feedback, which you can send using https://carnegiemnh.org/educator/crsp-2/.
Do you ever find yourself saying:

“It’s too wet to...”

or “This winter is so muddy”

or “It’s too hot for the...”

If you answered “yes”, you’re right.
According to the long term weather station in Indiana, PA, which has daily records going back to 1940:

- 3 of the 5 wettest years on record have happened since 2010 (2018, 2017, 2011 were 11-20 inches above normal).
- 4 of the 5 warmest winters occurred since 1990 (1998, 1990, 2006, and 2002 were were 5-7°F above normal, as was 1949).
- since the 1960s, summer night time minimum temperatures have warmed by 4.9°F (±0.3°).

These changes in weather have intensified weather-related risks to Indiana County farms. Read on for info on how to build resilience into your farming practices.

(For more information about these statistics see https://tinyurl.com/723abdmy)

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**Risks to production from PA weather extremes.**

Heavier downpours erode bare soils more quickly than in our grandparents’ time.

In the summer, hot night time temperatures reduce milk production.

Many tried-and-true best practices can improve farm resilience to these risks (table below).

Cover crops hold soils in place all year

Agroforestry provides shade

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**Practices that build resilience to weather extremes**

<table>
<thead>
<tr>
<th>On my farm?</th>
<th>PRACTICE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>DIVERSE CROP ROTATION</td>
<td>☑ ☑ ☑ ☑ ☑</td>
</tr>
<tr>
<td></td>
<td>☑ ☑ ☑ ☑ ☑ ☑ ☑ ☑</td>
<td>A diverse number of crops in a sequence to increase soil health. For example, add a small grain to a corn soy rotation.</td>
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<tr>
<td></td>
<td>COVER CROP</td>
<td>☑ ☑ ☑ ☑ ☑ ☑ ☑ ☑</td>
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<tr>
<td></td>
<td>NO-TILL</td>
<td>☑ ☑ ☑ ☑ ☑ ☑ ☑ ☑</td>
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<tr>
<td></td>
<td>LET WET SPOTS BE WET</td>
<td>☑ ☑ ☑ ☑ ☑</td>
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<tr>
<td></td>
<td>AGROFORESTRY</td>
<td>☑ ☑ ☑ ☑</td>
</tr>
</tbody>
</table>

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*Evapotranspiration is the movement of heated water into water vapor in the air via evaporation and through plants breathing (transpiration).
Sources for the information in the table are provided at: https://tinyurl.com/723abdmy.