Russian Invasion of Ukraine: Implications for U.S. Agriculture

Chris Zoller, Extension Educator, ANR, Tuscarawas County
Dr. Ian Sheldon, Professor, Andersons Chair in Agricultural Trade, Marketing, & Policy, The Ohio State University
Russian Invasion of Ukraine & Impacts to U.S. Agriculture

Topics

• Geography
• Agriculture in Ukraine
• Primary crops and production
• Ongoing questions/concerns
• Implications for U.S. agriculture
A Geography Lesson
Russian Control (~ 20% of Ukraine)

Source: UK MoD / institute for the Study of War (21:00 GMT, 9 June)
Agriculture in Ukraine

- Climate = Kansas
- 24” annual precipitation (~37.5” in Ohio)
- Winter (23 to 35 F)
- Summer (64-72 F)
- Slightly smaller than Texas (41 million people in Ukraine – 28 million in TX)
- Agricultural land area – a bit more than double the size of IL & IA
Agriculture in Ukraine

- Primary crops are wheat, sunflower, & corn
- Area measured in hectares
- Average wheat yield ~ 59 bpa
- Average corn yield ~126 bpa
- Ag = 22% of GDP
Ukraine Planting Calendar

Ukraine: Eastern-Southern (Northern Steppe) — Crop Calendar

- Barley (Spring)
- Corn
- Millet
- Oats
- Rye
- Wheat (Winter)

* Includes Luhansk, Donetsk, Kharkiv, Poltava, Dnipropetrovsk, Zaporizhzhia, Kirovograd, Nikolayev, Odessa

OHIO STATE UNIVERSITY EXTENSION • (INSERT NAME) COUNTY
Wheat Production in Ukraine

Source: State Statistics Service of Ukraine (Rosstat for Crimea Oblast)
Average Wheat Production 2016-2020
World Wheat Production

Figure 1. World Wheat Production and Export Shares, 2017-2021 Average
Corn Production in Ukraine

Ukraine: Corn Production

Production
5-year average
2016-20, 100 metric tons

Source: State Statistics Service of Ukraine (Rosstat for Crimea Oblast)
Average Corn Production 2016-2020

OHIO STATE UNIVERSITY EXTENSION • (INSERT NAME) COUNTY
Corn Planting - Ukraine

Ukraine Corn: Farmers Plant More Corn Despite Ongoing Conflict

Ukraine: Corn Planting Progress

Source: Ukraine Ministry of Agriculture

Planting is almost complete and as of June 6th, 4.59 million hectares have been planted.
Corn Production Estimate

Production is forecast at 25.0 mmt, up 28 percent from last month.

Source: USDA PSD Online
World Corn Production

Figure 2. World Corn Production and Export Shares, 2017-2021 Average

<table>
<thead>
<tr>
<th>Country</th>
<th>Production Share</th>
<th>Export Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>35.0%</td>
<td>20.0%</td>
</tr>
<tr>
<td>China</td>
<td>25.0%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Brazil</td>
<td>15.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>European Union</td>
<td>10.0%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Argentina</td>
<td>5.0%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Ukraine</td>
<td>2.5%</td>
<td>1.25%</td>
</tr>
<tr>
<td>Russia</td>
<td>1.25%</td>
<td>0.625%</td>
</tr>
</tbody>
</table>
Sunflower Seed Production in Ukraine

Ukraine: Sunflower Seed Production

Source: State Statistics Service of Ukraine (Rossstat for Crimea Oblast)
Average Sunflower Seed Production 2016-2020

Ohio State University Extension • (Insert Name) County
Sunflower Seed Production - Ukraine

Sunflower planting is almost complete. As of June 6, 4.66 million hectares have been planted, down about 25% from last year.

Source: Ukraine Ministry of Agriculture
World Sunflower Oil Production

Figure 5. World Sunflower Oil Production and Export Shares, 2017-2021 Average
Global Grain Trade

Breadbasket to the World
Russia and Ukraine account for a quarter of global grains trade

- 102m tons (Russia and Ukraine)
- 94m tons (U.S.)
- 56m tons (Argentina)
- 52m tons (EU)
- 40m tons (Brazil)
- 80m tons (Other)

Source: International Grains Council
Note: Estimates for the 2021-22 season, for wheat and coarse grains
Projected Harvest - 2022

General forecast for grains harvest:
50.4 million tons (in 2021 - 86 million tons).

Forecasts by crops:
Wheat - 18 million tons (2021 - 32.2 million tons);
Corn - 25.7 million tons (2021 - 42.1 million tons);
Barley - 5.2 million tons (2021 - 9.4 million tons);
Other cereals - 1.4 million tons (2021 - 2.3 million tons).
Primary Shipping Ports

Ukraine Grains Shipments
The country's top grain-handling ports are in the southwest

Source: UkrAgroConsult
Note: National export volume percentage for 2020-21 season
Farming During War
Grain in Storage

Ukraine Crop Backlog
Country's reserves far exceed normal as war hampers exports

- End-of-season corn stockpiles
- Barley
- Wheat
- Sunflower

Source: USDA

Bloomberg
Media Reports (June 10)

- Reuters writer Conor Humphries reported today that, “As 10-metre high mounds of sunflower meal smoulder among the blackened ruins of one of Ukraine’s top agricultural terminals.”

- “Few in the region hold out hope that diplomatic efforts will unblock the Black Sea. They said a few convoys of ships would not even dent the volumes that need to be exported, and it is not economical to send the same grain by road.”

- “Ukraine is the world’s fourth-largest grain exporter and it says there are some 30 million tonnes of grain stored in Ukrainian-held territory which it is trying to export via road, river and rail,” the Reuters article said.
Media Reports (June 23)

- Alistair MacDonald, Bojan Pancevski and Drew Hinshaw reported in today’s Wall Street Journal that, “Russian forces targeted at least two large North American-owned grain terminals in the Ukrainian port of Mykolaiv on Wednesday, as part of what Kyiv and Western governments say is a campaign to degrade Ukraine’s ability to export food.”

- “Russia has repeatedly hit the bridge that Ukrainian farmers and traders say they use to take grain to the Romanian border and the port of Constanta. A large sunflower-oil processing plant and other grain terminals have also been hit, and Wednesday’s attack is the second time Bunge has been targeted.”
Media Reports (June 23)

- “‘Even if an agreement were reached today, safe passage could take months to complete,’ Rabobank analysts said Wednesday in an emailed note. ‘A return to Ukrainian export normality is currently not in sight.’”

- “Ukrainian grain exports in the first 22 days of June fell by 48% from a year earlier to 907,000 tonnes, agriculture ministry data showed on Wednesday.

- “Rather than using Ukraine’s ports to export its wheat, sunflower oil, corn and other produce, proposed alternatives have included either exporting it across Ukraine’s western borders into Poland or transporting it southwest into Romania, across the Danube River and out through the Romanian Black Sea port of Constanta.

- “‘There’s been a mad rush to find alternatives’ for Ukraine’s grain exports, said Mike Lee, a specialist in Black Sea agricultural projects at Green Square Agro Consulting in Britain. ‘But the only real viable route to exporting grain out is through the Black Sea ports, and there’s no alternative to get to the quantities that need to be shifted.’”
Economic Costs

Immense Damage
Russia's invasion has cost $4.3 billion to Ukraine's food sector

- $0.61b Stored products
- $0.35b Other
- $0.27b Storage facilities
- $0.93b Machinery
- $2.14b Farmland and unharvested winter crops

Source: Kyiv School of Economics, Ukraine agriculture ministry
Significant Losses - Indirect

- $23 billion
- Production losses
- Logistical issues
- Lowered production

Diagram:
- Due to logistics disruption and lower prices for export-oriented commodities: 51%
- Due to crops production decrease: 42%
- Due to livestock production decrease: 3%
- Due to higher production costs: 4%
Ongoing Questions/Concerns

• How long will the war last & how far will Russia advance?
  Sunflower & wheat crops likely most affected - location

• Global food security
  Some parts of the World were dealing with food security issues before war
  Keeping domestic prices artificially low could exacerbate problem

• How long will seaports remain closed to grain export?
  Will Russia allow export by sea?
  Ukraine loses $170 million daily – blocked seaports

• Issues with rail transport to EU – rail gauge size differences

• Growing conditions & eventual harvest – what will Ukrainian farmers accomplish?
Ongoing Questions/Concerns

- Construction of temporary grain storage – amount? How quickly? Condition?
- U.S. growing season weather
- U.S. prevent plant acres – 2022
- Brazil’s Safrinha crop – China & Brazil agreement
- South American crop – 2023
- Input costs for 2023 – fertilizer, fuel, chemicals
- USDA programs to increase food production?
Fertilizer Pricing

Production Costs

<table>
<thead>
<tr>
<th>Product</th>
<th>Unit</th>
<th>Offer</th>
<th>Average</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anhydrous Ammonia</td>
<td>Per ton</td>
<td>1400.00-1750.00</td>
<td>1607.80</td>
<td>DN 27.78</td>
</tr>
<tr>
<td>Urea 46-0-0</td>
<td>Per ton</td>
<td>874.00-1010.00</td>
<td>944.67</td>
<td>DN 46.00</td>
</tr>
<tr>
<td>Liquid Nitrogen 32-0-0</td>
<td>Per ton</td>
<td>568.75-700.00</td>
<td>629.62</td>
<td>DN 7.50</td>
</tr>
<tr>
<td>DAP (Diammonium Phosphate 18%N 46%P)</td>
<td>Per ton</td>
<td>858.29-1125.00</td>
<td>1009.04</td>
<td>UP 13.49</td>
</tr>
<tr>
<td>MAP (Monoammonium Phosphate 11%N 52%P)</td>
<td>Per ton</td>
<td>880.00-1100.00</td>
<td>971.00</td>
<td>DN 40.67</td>
</tr>
<tr>
<td>Potash (Potassium)</td>
<td>Per ton</td>
<td>777 (m-49%)</td>
<td>861.76</td>
<td>DN 0.40</td>
</tr>
<tr>
<td>Farm Diesel &lt; 1000 gallons</td>
<td>Per Gallon</td>
<td>5.14-5.45</td>
<td>5.25</td>
<td>UP 0.58</td>
</tr>
</tbody>
</table>

Please Note:
1 - Production costs items statewide: cash prices bulk, FOB CD-OP/Elevator. Fertilizer in granular form unless noted.

Iowa Production Cost Summary

Production Costs

<table>
<thead>
<tr>
<th>Product</th>
<th>Unit</th>
<th>Offer</th>
<th>Average</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anhydrous Ammonia</td>
<td>Per Ton</td>
<td>1,420.00 – 1,650.00</td>
<td>1,556.20</td>
<td>DN 5.55</td>
</tr>
<tr>
<td>Urea 46-0-0</td>
<td>Per Ton</td>
<td>650.00 – 1,075.00</td>
<td>833.00</td>
<td>DN 109.75</td>
</tr>
<tr>
<td>Liquid Nitrogen 28-0-0</td>
<td>Per Ton</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Liquid Nitrogen 32-0-0</td>
<td>Per Ton</td>
<td>640.00 – 785.00</td>
<td>687.50</td>
<td>DN 67.50</td>
</tr>
<tr>
<td>Lime (Applied)</td>
<td>Per Ton</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>DAP (Diammonium Phosphate 18%N 46%P)</td>
<td>Per Ton</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>MAP (Monoammonium Phosphate 11%N 52%P)</td>
<td>Per Ton</td>
<td>925.00 – 1,147.00</td>
<td>1,034.50</td>
<td>DN 43.75</td>
</tr>
<tr>
<td>Potash (Red) 0-0-60</td>
<td>Per Ton</td>
<td>810.00 – 968.00</td>
<td>885.83</td>
<td>DN 6.42</td>
</tr>
<tr>
<td>Potash (White) 0-0-62</td>
<td>Per Ton</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Farm Diesel &lt; 1000 gallons</td>
<td>Per Gallon</td>
<td>4.70 – 5.35</td>
<td>4.95</td>
<td>UP 0.30</td>
</tr>
<tr>
<td>Propane (LP Gas) &lt; 1000 gallons</td>
<td>Per Gallon</td>
<td>1.80 – 1.82</td>
<td>1.81</td>
<td>DN 0.13</td>
</tr>
</tbody>
</table>

Please Note:
1 - Production costs items statewide: cash prices bulk, FOB CD-OP/Elevator. Fertilizer in granular form unless noted.

OHIO STATE UNIVERSITY EXTENSION • (INSERT NAME) COUNTY
Fertilizer Prices Declining

Sharp Decline

Fertilizer prices drop again as demand stalls due to high prices

North American Fertilizer Prices

Source: Green Markets, Bloomberg
Historical Daily Wheat Prices ($/bu.)
All Foods & Vegetable Oil Prices

Global food prices, especially of oils, have surged to record highs
Food indices, real prices (2014-2016 average = 100)

Source: [FAO](https://www.fao.org) *An average of soybean, sun, rape, groundnut, cotton, coconut, palm kernel, palm, linseed and castor oil.
## OSU Extension Crop Budgets (2022)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Receipts</th>
<th>Variable Costs</th>
<th>Fixed Costs</th>
<th>Total Costs</th>
<th>Return Above all Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn ($7 &amp; 183 bu./ac.)</td>
<td>$1,285</td>
<td>$643</td>
<td>$410</td>
<td>$5.74/bu.</td>
<td>$232</td>
</tr>
<tr>
<td>Beans ($14.25 &amp; 57 bu./ac.)</td>
<td>$805</td>
<td>$335</td>
<td>$343</td>
<td>$12.00/bu.</td>
<td>$126</td>
</tr>
<tr>
<td>Wheat ($7.50 &amp; 74 bu./ac.)</td>
<td>$555</td>
<td>$284</td>
<td>$308</td>
<td>$8.98/bu.</td>
<td>-$37.83</td>
</tr>
</tbody>
</table>
Implications for U.S. Agriculture

• Many unknowns and much we can’t control
• Agriculture operates in a global environment - & this situation makes it even more evident
• Stay informed about the situation – read, listen, talk
• How might this war impact your business?
• Are there market opportunities?
• Wheat is getting more attention
• Understand your cost of production
The WRRU is a charity fundraising project aimed to help Ukrainian village citizens rebuild their homes and restore their small ag production capacities after damage by Russian military forces.

- Organization raising funds to rebuild rural Ukraine
- [https://www.wrru.org/live/](https://www.wrru.org/live/)
Additional Information

- USDA Foreign Agricultural Service [https://www.fas.usda.gov/](https://www.fas.usda.gov/)
- Farmdoc – Univ. of Illinois [https://farmdocdaily.illinois.edu/](https://farmdocdaily.illinois.edu/)
- OSU Extension Enterprise Budgets [https://farmoffice.osu.edu/farm-management/enterprise-budgets](https://farmoffice.osu.edu/farm-management/enterprise-budgets)
- OSU Extension Ohio Ag Manager [https://u.osu.edu/ohioagmanager/](https://u.osu.edu/ohioagmanager/)
Questions?

Chris Zoller, Zoller.1@osu.edu or 330-827-0249
Dr. Ian Sheldon, Sheldon.1@osu.edu or 614-292-2194