

Theodore Holthaus

Waukon High School

Waukon, IA

Ukraine, Sustainability and Education

## **Sustaining the Breadbasket of Eastern Europe**

Ukraine is one of the most fertile countries in the world. It is the world's leading exporter of sunflower oil, third largest exporter of barley, and fourth largest in corn. Why then is this paper submitted to a project usually reserved for struggling countries? It was submitted there because of the need to preserve and sustain Ukraine's agricultural fertility, for decades and centuries to come. Early on it was considered that this paper discuss ways to reinvigorate Ukraine's agriculture industry, but it soon became apparent that it was not necessary. Not only is Ukraine not failing, it is thriving. In 2016 the grain output for Ukraine was 66 million tons, increasing by 6 million tons from 2015 (The Economist). The problem lies in sustaining this fertility. Therefore, the purpose of this paper is addressing the need to sustain Ukraine's fertile lands while advocating for agricultural education within Ukraine to teach the younger generation about how to implement those methods.

The Ukraine has undergone many challenges throughout its history, only gaining its full independence on August 24<sup>th</sup>, 1991 (The World Fact-Book: Ukraine). It is now controlled by a semi-presidential government. For most of the twentieth century, the Ukraine was controlled by the Union of Soviet Socialist Republics, also called the USSR. This had a profound impact on the lives of those subjugated by Soviet occupation. The largest changes it brought about were that of collectivism and intensive industrialization. Private farms were seized by the state, the inhabitants' lives changing forever. Most were set to work the land they had once owned for the Communist government. Many others became emigrants within the vast country of the USSR, sent to work the factories and plants that began belching smoke all across the steppes. Even though their lives had changed many times the Ukrainian family itself has never lost its identity.

The average household in Ukraine spends 38.4% of their annual income to purchase food (The Economist). For reference, an average household in the United States spends only 6.6% of their annual income on food (The Economist). On average, a household in Ukraine consists of a mother, father, and one or two children. In some urban areas it is not uncommon to find several generations living together in inadequately sized homes. This issue has fortunately been noted and is beginning to be addressed by the European sect of the United Nations. The average sized home in an urban setting has an area of 561.87<sup>2</sup> feet or 52.2<sup>2</sup> meters (Alkalaj). Whereas rural homes have an average area of 645.84<sup>2</sup> feet or 60.2<sup>2</sup> meters (Alkalaj). Access to roads, local markets, and clean water is not a large problem in Ukraine. An interesting facet of Ukraine's demographics is its shrinking of large cities such as Donetsk, Odessa, and Kharkiv, though Kiev has not experienced a decline in population (Alkalaj). 44,033,874 people live in Ukraine as of March 16, 2018 (The World Fact-Book: Ukraine). Though it is decreasing at a rate of -0.41% a year (The World Fact-Book: Ukraine).

There are about four million farms in Ukraine that are farmed by a household that lives and works that land for their own use and sale. On average these farms are 1.23 hectares, just over 3 acres, large (Ukraine - Agricultural Sector). This sector of farming produces 45% of Ukraine's gross agricultural output (Ukraine - Agricultural Sector). The other 55% of gross agricultural output is produced by agricultural enterprises (Ukraine - Agricultural Sector). An estimate made by export.gov states that there are "32,000 farm enterprises, 10,000 corporate agricultural enterprises, and 241 state enterprises" that make up the latter sector of agriculture in Ukraine (Ukraine - Agricultural Sector). It is a good time to note that most large scale dairy and poultry farms are situated near large cities. This is also true for market farming, the practice of bringing produce straight to a market, i.e. farmer's markets in America. These cities include Kiev, Kharkiv, and Zaporizhzhya (Britannica).

As stated before, Ukraine is the world's leading exporter of sunflower oil and fourth largest exporter of corn. The country's soil can be separated into three distinct types, running in bands across the country. In the north of Ukraine, the soil is sandy and podzolized requiring supplemental nutrients to produce good harvests. Podzolized is a soil type with a layer of low or no organic matter which has been bleached of all nutrients (Britannica). The southernmost band consists of chestnut layers, which become increasingly salinized the further south one travels. Ukraine's central band is the largest and most fertile, making up two-thirds of the country's area. This central band contains 30% of Earth's black soil (Ukraine - Agricultural Sector). It is rich in humus and organic matter, though intensive farming and deforestation are beginning to take their toll on the soil. As for Ukraine's climate and precipitation, it is ideal for a wide production of crops. Ukraine has a mild temperate climate, with average temperatures in January hovering around 26° F and 73° F in July (Britannica).

Now that the background of Ukraine's geography, demographics, and agriculture industry has been set, it is time to discuss the purpose of this paper: sustaining and improving Ukraine's current agricultural fertility and productivity along with its economic viability. As it has in the United States, concern for sustaining the productivity of the soil is beginning to concern some farmers. In the U.S. several laws and acts have been passed to preserve the rich soil of the Midwest and the rest of the country. These actions were all well intentioned, but many of them induced the skepticism of the common farmer. Largely this was due to the drop in profits farmers rely on annually. One example of this is not harvesting from a field for an entire growing season while a cover crop such as rye grows and subsequently decomposes into the soil. Many more efficient plans and systems have been devised to maximize the usefulness of the field. This paper will explore several methods that could be implemented in Ukraine.

As many farmers and scientists in America and around the world know, organic material is essential to the health and productivity of a soil. Black soils are well known as being one of the most fertile soil types in the world. Black soil is composed mainly of organic materials that contain many of the necessary nutrients that plants need, known as humus. This humus is made up of decomposed plants' stalks and (especially) roots and the microbes that decompose it. One way to keep that soil producing at high levels is to add fertilizers and nutrients directly into the ground. This essentially replaces the need for organic matter as it becomes depleted. One issue with using this method to keep ground fertile is that it is difficult to sustain over large periods of time. As time passes, the natural nutrients and chemical bases are

depleted. The more depleted the soil is of its original amount of humus, the more artificially placed chemicals and nutrients must be used to keep the soil fertile. This system of production makes for large sums of money being spent towards fertilizers and nutrients, where a healthy soil can do that without the money or middlemen.

One way to keep soil fertile, without using large amounts of fertilizers, is to plant cover crops over the empty growing field in the fall, leaving it in the ground through the winter. When spring comes around the cover crop is mowed or crimped to create a blanket of dead plants under which the usual crop is planted. It may sound counterproductive to growing the original plants, but this blanket of dead plant matter will act as a barrier to weeds while the crop grows and germinates without the need of herbicides. The plant blanket will decompose over the year depositing organic material in the soil, which will contribute to its fertility. Not only does the cover crop keep the soil rich, it also prevents erosion. This is due to the extra roots in the ground to hold it in place during rain storms and dry, windy days. Yield either increases or stays steady when crop covers are used, with the exception of already dry locations. The new cover depletes the precious moisture in the ground prior to the cash crop. For that reason, it would be unwise to use the method of cover crops in relatively dry regions, such as Ukraine's lowlands by the Black Sea. That is nice to know, but how can it be used in the setting of Ukraine?

As stated above, there are three large bands of soil types in Ukraine. The northernmost band of soil, an unremarkable soil that is neither extremely fertile or infertile, would require additional soil supplements even along with the use of cover crops to achieve the best yields. This is because podzolized soils often have a rich layer of humus, but that layer is beneath a layer of soil that has been bleached of its nutrients and base chemicals. One way to make this soil more productive would be to implement cover crops. The cover crops would allow this soil to accumulate organic material from past years of cover crops to make the top layer of soil nutrient rich. The central band of soil is already rich in humus and the nutrients it produces. The main focus in this area would be to implement cover crops and crop rotations to keep the soil fertile, not so much to improve it. This is because keeping Ukraine fertile will supply food to the entire region.

To implement cover crops in an effective way, modern or relatively modern farming equipment will be needed to carry out cover crops successfully. When referencing modern technology in this paper, it is a reference to agricultural technology developed since 1950 or so. 1950 is not the desirable era for equipment used today, but it is where equipment stops being viewed as modern in this paper. To effectively utilize cover crops, the standard crop must be able to be planted, into the crimped, mowed, or standing cover crop. This can be done by weighting down a standard hitch planter with tractor weights, or even rocks. This will help the planter cut through the cover crop and plant directly into the ground.

The cover crop also needs to be mowed or crimped, to fulfill its purpose as a cover for the main crop. Prices of crimpers are comparable to, or less than, tillage equipment, and will cost more for a wider crimper. Prices range from about 3,600 US dollars for an 8 foot crimper, to about 42,000 US dollars for a massive 40 foot wide crimper. (I&J Manufacturing) Purchasing crimpers isn't the only way to get a crimper; they can also be made with a little ingenuity and some seemingly disparate items. Farmers can

always benefit from ingenuity, no matter in what country or in what economic state they are in. Finally, crop rotations can be implemented in most situations, from big too small operations.

The importing of farming equipment is a quickly expanding industry in Ukraine. AGCO, John Deere, and Case are all available in Ukraine for purchase within the country. (Ukraine - Agricultural Sector) Depending on the acreage of the farm they are serving, large equipment is not necessary. 40 foot wide planters aren't necessary for a farm with only 5 acres. It would be more efficient to make more passes with a cheaper and smaller piece of equipment. One way to make more specialized equipment more widespread is through the sharing of said equipment. If two people share a crimper between them, it can help the financial burden of purchasing one for each. It relies on people to make a difference too, not just the government. This method will not always work, however. Large distances between other neighbors, disagreements between farmers, and having a farm large enough that a crimper will need to be available at a moment's notice. These will all be barriers to the method of sharing equipment. In other scenarios it may be the needed nudge to allow farmers to take up this method of agriculture.

*"Without labor, neither knowledge nor wisdom can accomplish much."* This is the line spoken at the beginning ceremony of every FFA meeting by the Vice President. Theories of different methods are nice to talk about, but they are useless if not implemented. This is where the education aspect of this paper comes into play. Ukraine's population is at a decline, shrinking by 0.46% a year (The World Fact-Book: Ukraine). The average age of a citizen in Ukraine is 34 years old (The World Fact-Book: Ukraine). This means that the older generation is beginning to die off or retiring, leaving less young people to inherit their careers. This extends to the industry of agriculture. Education is the driving point here, the younger generations of Ukrainians must be educated about how to successfully produce high yields and sustain the lands fertility for the next generation.

One way to educate young Ukrainians about agriculture is through an organization akin to the United States FFA. It would take individuals that are passionate about agriculture from all generations to start this organization. Such an organization could provide the knowledge and means through which young Ukrainians might begin farming. Hands on experiences are often the best teachers, and here this could be put to full use. Students might work a small garden plot along with their peers to learn the basics of horticulture. Perhaps this Ukrainian organization might provide information for both young and old farmers. New methods, equipment, and crops could be exchanged at meetings, resulting in a rise in agricultural success.

Funding for this program might come from the government, as agriculture accounts for such a large portion of its GDP. Another way this might be funded would be through charities begun in countries like the United States, Canada, or the Ukraine itself. To encourage the entire industry of agriculture in Ukraine, funding may be put towards subsidies to artificially inflate the market. Of course this funding would need to come from the Ukrainian government itself. This funding would have to be balanced out with other programs. Starting out with a small incentive and then increasing as they are better able to balance it. Though the people of Ukraine must have their opinions heard before any moves be made.

Unfortunately when writing this paper, no reliable secondary source on Ukrainian farmers or dignitaries' thoughts on topics similar to this could be found.

In conclusion, Ukraine is a country that, despite political unrest in the east, is doing very well in the agricultural sector. The focus is now being not to improve the production being made, but to preserve the fertility and productivity of the country's rich natural resources. This can be accomplished through the use of methods like cover crops and crop rotations, then educating the younger generation of Ukraine about how to implement those methods successfully. The new generation must be the one to lead the way to Ukraine's success in the future.

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