Introduction:

Planted in the spring of 2017, the Weinland Park Berry Patch has provided the surrounding neighborhood with a source of abundant fruit including strawberries, raspberries, elderberries, blackberries, blueberries, aronia, and currants. Additionally, this park has been a location of community congregation and communion. In order to fully understand the soil chemistry of the Weinland Park Berry Patch, a soil test was administered by Franklin County Master Gardeners in the summer of 2020. The samples were sent to Penn State Extension for analysis and recommendation. Further understanding of the soil composition will be provided in this report.

Methodology:

On June 6, 2020, a series of soil samples were taken from the four main beds located at the Weiland Park Berry Patch. The four main beds are identified in Image 1.

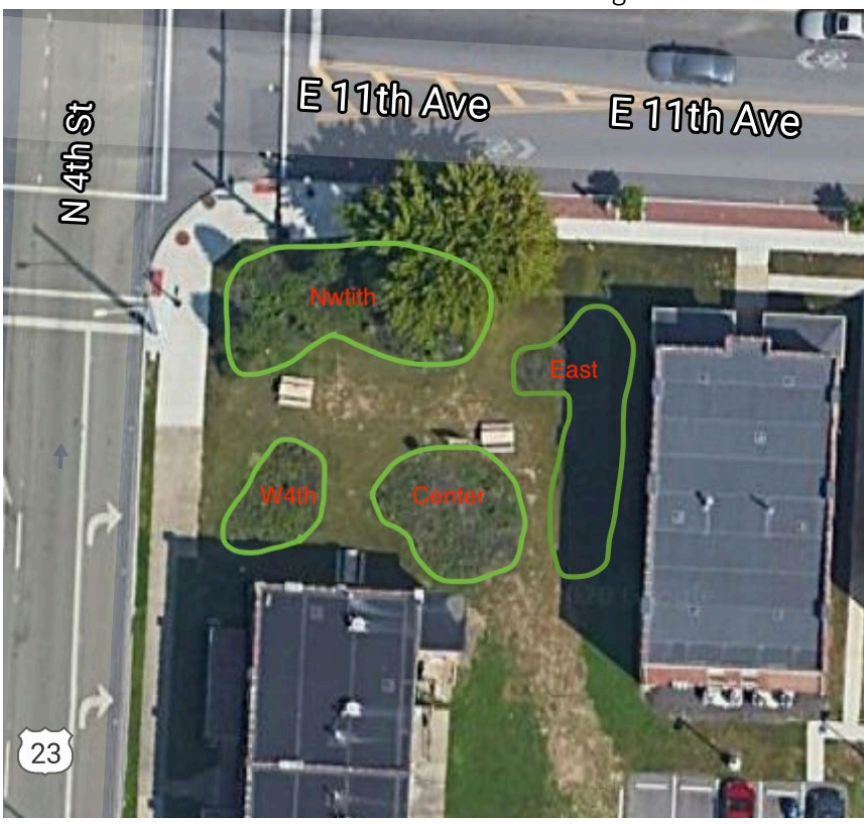

Figure 1: Identification of the four beds located within the Weinland Park Berry Patch. Image taken from Google Maps 2020.

In accordance with the *Soil Testing for Ohio Lawns, Landscapes, Fruit crops, and Vegetable Gardens* Factsheet, we collected four to five subsamples of the four separate berry patch beds. Using a clean gardening spade and in a random zig zag pattern, we dug approximately five to six inches into the soil, removed the organic top layer, and combined those subsamples in a clean plastic bucket. Any remaining lumps in the soil sample were broken apart, rocks and organic debris was removed, and we ensured they were fully dried before we measured off approximately one pint of the sample. The samples were mailed to the Penn State Extension office for their analysis.

Results:

In general, each sample was evaluated at the Penn State Extension soil laboratory on the primary fruit grown in each bed. As indicated in Table 1, we were able to ask for evaluations on the basis of brambles, strawberries,

and apple, mixed fruit, nuts. Because there was no evaluation available for elderberries and aronia, we decided to evaluate the soil based off of the needs of apple trees due to their similar soil nutritional needs.

Table 1: Identification of specific testing done with corresponding serial numbers and field IDs.

Serial #	Field ID	Tested For	Secondary Fruit
43412	East	Brambles	Strawberry
43245	W4th	Strawberry	Elderberry
43246	Nwtith	Apple, mixed fruit, nuts	Elderberry Aronia
43247	Center	Strawberry	Mulberry

Soil nutrient levels include testing for soil pH, phosphate, potash, magnesium, and calcium. Each of these nutrient levels were then indicated to be in 'below optimum,' 'optimum,' or 'above optimum' levels. Below optimum levels indicate that the soil nutrient will likely limit crop yield. Optimum levels indicate that the nutrient level is in an ideal amount. Above optimum levels indicate that the nutrient amount is more than ideal. While crop yield is not impacted at this level, any additional nutrient added may impact crop yield (Plant Nutrients - major & minor, 2016). In general, all four beds showed above optimum results for soil pH, phosphate, magnesium, and calcium with only the Nwtith bed showing only 'optimum' levels for soil pH. All four samples showed below optimum levels for potash. Because soil nutrient levels were optimum or above optimum, there were no recommendations to apply additional calcitic limestone, magnesium, or gypsum in order to correct corresponding soil pH, calcium, and magnesium levels. Penn State Extension provided Nitrogen, Phosphate, and Potash Recommendations for all four samples as seen in Table 2.

Table 2: Field IDs and corresponding Nitrogen, Phosphate and Potash Recommendations as provided by Penn State Extension

Field ID	Nitrogen, Phosphate, and Potash Recommendation
East	Apply 1.5 lbs per 100 square feet of 10-10-10
W4th	Apply 0.75 lbs per 100 square feet of 10-10-10
Nwtith	Apply 0.1 lbs per 100 square feet of UREA and 0.25 lbs per 100 square feet of 0-0-60
Center	Apply 0.75 lbs per 100 square feet of 10-10-10

Finally, each of the provided samples were indicated to have high pH values. Because of these high values, it was also recommended that we use sulfur to lower pH values to an optimum level. Using a provided matrix, Table 3 indicates the amounts of sulfur needed to lower each bed's pH to optimum levels.

Table 3: Field IDs and their corresponding current and optimum pH values. Final column indicates the amount of sulfur (lb/100sq ft) needed to lower each pH value.

Field ID	From Current Soil pH	To Optimum Soil pH	Sulfur (lb/100sq ft)
East	7.5	6.0	2.50
W4th	7.5	6.0	2.50
Nwtith	7.5	6.5	1.25
Center	7.5	6.0	2.50

Discussion:

Historical Use of Weinland Park Berry Patch Location

The history of the Weinland Park Berry Patch property is mainly unknown. However, additional research into the Franklin County Auditor Website has provided some background information that may help us understand the soil quality of this piece of land. Figure 2 indicates that this piece of property once had 4 units of 2 story dwellings. These dwellings were demolished in February of 2014 after the property sold in October of 2013 to the City of Columbus/Weinland Park Properties (Figure 3). Anecdotal evidence cites this to be the location of a bar called 'Positively Fourth Street' that was popular in the 1970s but laid vacant throughout the 1980s. Upon creation of the Weinland Park Berry Patch, new topsoil was provided to all four beds. Because this land is very close to a former gas station and current car repair station, there was concern that the soil may be impacted by some previous land use. However, no contaminants were found during additional soil testing done by Ohio State University's soil analysis laboratory.

Parcel ID: 010-019572-00 **Map Routing: 010-C003 -080-00**
WEINLAND PARK PROPERTIES II LLC **293-299 E ELEVENTH AV**

PERMITS

Date	Est Cost	Description
02-10-14	$55,140	293-299 E 11TH AVE DEMOLITION OF 4 UNIT 5772 SQ FT 2 STORY DWELLING
07-15-05	$0	GAS PIPING

Figure 2: Historical permit records found through the Franklin County Auditor website

Parcel ID: 010-019572-00 **Map Routing: 010-C003 -080-00**
WEINLAND PARK PROPERTIES II LLC **293-299 E ELEVENTH AV**

Parcel | Sales

Date	Grantor	# of Parcels	Sale Price
JUN-19-2020	WEINLAND PARK PROPERTIES II LLC	2	$0
OCT-07-2013	WEINLAND PARK PROPERTIES	25	$0
OCT-07-2013	CITY OF COLUMBUS OHIO	25	$0
JAN-02-2013	WEINLAND PARK PROPERTIES	24	$400,000
DEC-28-2006	COMMUNITY PROPERTIES OF	4	$358,950
MAY-17-2005	SUMMERFIELD HOMES LLC	31	$2,543,054
APR-30-2003	COMMUNITY PROPERTIES OF	268	$28,295,497
APR-30-2003	COMMUNITY PROPERTIES OF	268	$0
APR-22-2003	COMMUNITY PROPERTIES OF	29	$0
SEP-17-1979	POLARIS	0	$0

Figure 3: Sales summary of the Weinland Park Berry Patch property from 1979 until present.

Need of Urea in Nwtith Bed

As available, each bed within the Weinland Park Berry Patch was evaluated based on the primary fruit grown within. Because Penn State Extension was unable to evaluate the Nwtith bed for elderberries, we chose to have them evaluate the bed for apples, mixed fruit, nuts. Apple trees and elderberries grow in similar soils and need similar nutrients. The recommendation to amend the soil with 0.1 lbs. per 100 square feet of urea is aligned

with the yearly needs of elderberry. This addition is to be done in the spring each year for the duration of the plants' life (Stafne).

High pH Value for Each Bed

Each of the four beds tested were found to have high pH values of 7.5. High pH values indicate alkaline soil that has been derived from limestone parent materials in Central Ohio (Robert Mullen, 2016). As seen in Table 3, Penn State Extension recommends an addition of sulfur at various amounts to help reduce the pH values. Lowering pH values in soil is a difficult chemical process that will need to be repeated. The addition of sulfur to lower the pH value of soil is not an effective long-term strategy.

Overall Recommendations for Plant Species

As depicted in Table 1, each bed was evaluated for the predominant fruit species. While strawberries, elderberries, and raspberries dominate the Weinland Park Berry Patch, we find many other fruit species throughout the beds. Aronia, blackberry, currants, and blueberries are also scattered throughout. While Penn State Extension has provided recommendations based off of specific evaluations, this section will provide further understanding of the overall needs for robust harvests of strawberries, elderberries, and raspberries.

Table 4: When to apply soil amendments

Plant	Time of year	Amendment
Strawberry	After fruiting, again in September	10-10-10
	Six months apart	Sulfur
Elderberry	Fall or spring	0-0-60
	Spring	Urea
	Six months apart	Sulfur
Raspberry	March and May	10-10-10
	Six months apart	Sulfur

Strawberries

Soil pH is vital for a robust strawberry harvest. Ideal strawberry pH is 6.2. Each bed is identified to have a pH of 7.5. Ideally, sulfur would have been added to the soil prior to planting, but in its absence, it is recommended that sulfur is added to the soil to lower pH in the spring before harvesting (Longstroth). All four beds are either predominately strawberry or are underplanted with strawberries (Nwtith). Because the strawberries are already established, future fertilizers should be applied immediately after fruiting and additionally in early September. Do not apply fertilizer containing nitrogen in the spring before the plants have a chance to fruit. It is important to note that fertilizers should be kept off of the plant leaves and should only be applied as side dressing to prevent leaf burn. Finally, fertilizer should not be worked into the soil. Instead, lightly rake the soil, apply the fertilizer, and allow water to work the fertilizer further into the soil bed (Cornell).

Elderberries

Elderberries are hardy natives to North America (Wilson, 2016, p. 3). Ideal pH is identified between 5.5 and 6.5. Elderberries grow best in full sun, but also produce well in partial shade (Wilson, 206, p. 6). The clay-rich soils in the Weinland Park Berry Patch are not ideal for elderberries which prefer well-draining soil. However, as long as the plants do not sit in standing water for more than two days, the elderberry plants should thrive. (Wilson, 2016, p.12). Because Elderberries are so dependent upon soil quality, UVM suggests spending time improving the soil structure through the addition of high-quality compost. By conditioning the soil, vital nutrients are less likely to be washed away and moisture will be retained during the long, hot parts of summer (Wilson, 2016, p 19). Finally, both weed control and pruning should be prioritized. Because elderberries have such shallow root

structures, weeds are especially harmful. Pruning should be done in late winter to remove any canes that are dead or weak. Canes older than three years should also be removed (Kennedy, 2018).

Raspberries

Overall recommendations for a hearty raspberry harvest include maintain a proper pH between 5.5 and 6.5. Nitrogen, potassium, and phosphorous are the primary nutrients necessary for optimal raspberry growth and should be applied as side dressing to prevent root damage. As recommended by the Penn State Extension results, all three nutrients are suggested in equal amounts. Outside of those primary nutrients, it is also recommended to add organic matter to help condition the soil for better aeration and drainage (Getting the most out of your raspberry soil test report). Fertilizer should be spread twice a year. First, in March and again in May. Raspberries are susceptible to phytophthora root rot; therefore, well-drained soil is necessary for optimal harvests. Additionally, mulching is not recommended around raspberries (Gao, 2017).

Works Cited

Cornell. (n.d.). *Getting the most out of your strawberry soil test report.* Retrieved from Cornell CALS: http://hort.cornell.edu/gardening/soil/strawberries.pdf

Gao, G. (2017, January 12). *Raspberries for the Home Fruit Planting.* Retrieved from Ohioline: https://ohioline.osu.edu/factsheet/hyg-1421

Getting the most out of your raspberry soil test report. (n.d.). Retrieved from Cornell CALS: http://hort.cornell.edu/gardening/soil/raspberries.pdf

Kennedy, R. (2018, March 13). *Minor Fruits: Elderberries.* Retrieved from Cornell University: http://www.hort.cornell.edu/fruit/mfruit/elderberries.html

Longstroth, M. (n.d.). *Lowering the Soil pH with Sulfur.* Retrieved from Michigan State University Extension: https://www.canr.msu.edu/uploads/files/Lowering_Soil_pH_with_Sulfur.pdf

Plant Nutrients - major & minor. (2016). Retrieved from Center for Agriculture, Food and the Environment: https://ag.umass.edu/fruit/ne-small-fruit-management-guide/general-information/plant-nutrients-major-minor

Robert Mullen, E. L. (2016, November 2). *Soil Acidity and Liming for Agronomic Production.* Retrieved from Ohioline: https://ohioline.osu.edu/factsheet/AGF-505-07

Stafne, E. T. (n.d.). *Growing Elderberries in Oklahoma.* Retrieved from Oklahoma Cooperative Extension Fact Sheet: http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Rendition-7558/unknown

Wilson, R. (2016). *University of Vermont.* Retrieved from Growing Elderberries: a production manual and enterprise viability guide for Vermont and the northeast: https://www.uvm.edu/sites/default/files/media/ElderberryGuideComplete.pdf