

WVU Extension Crop Fertilization Recommendation Software and Databases

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This document provides future WVU Crop Fertilization Recommendation Software and Database administrators an outline to understand input functions, recommendations, database structure and output produced by this tool.

In 2017, WVU faculty started revising the WVU fertilizer recommendations and report software to update recommendations based on Mehlich 3 soil extraction, crop yield response to soil type, and include commercial vegetable crop recommendations. This new system was implemented in 2018. This document outlines the software used to generate the recommendation report with recommendation, report and customer databases.

Software Interface

The software used for developing the WVU Fertilizer Recommendation System (FRS) is the Cold Fusion Mark-Up Language (CFML) by Adobe Software. The FRS interface has been constructed to be as self-directing as possible. One software constraint that may cause confusion is that some pages will initially have a single dialog box, while other dialog boxes only show up as needed once initial and earlier boxes are filled in.

Login Page

To use the Fertilizer Recommendation System, use the following web address to log in: <http://w1p-extprod000.wvu-ad.wvu.edu/soiltesting/login.cfm> (Figure 1).

Figure 1. WVU Fertilizer Recommend System login page.

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EXTENSION SERVICE

WVU Fertilizer Recommend System

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WVU Extension Service - Agriculture and Natural Resources

Please enter your **EMAIL** and password...

Registered Email Address:

Password:

Log In

[Forgot Password?](#)

[Claim Your ANR Account](#)

Still can't login? - give Extension Technology a call at (304) 293-8967 for help!

Enter the WVU email address and password that was used to create an account. If the user does not have an account, they need to click on the *Claim Your ANR Account* link and enter their WVU email address, case sensitive password and confirm the password. Only authorized WVU Extension staff and faculty and Davis College faculty are authorized to have administrative accounts.

Those using the system must be registered by the system administrator and assigned a level of authority. County faculty have authority to look up sample submissions, update and save the soil series on a submission, generate alternative crop fertilizer recommendations for a submission, and generate summary reports from the submission database. Alternative crop code recommendations are not saved in the submission database but are saved as a note in an alternative crop code file. County faculty have authority to view data tables, but not to edit data tables. System administrators have authority to edit data tables and submissions.

Home Page

The home page is the system's center of operation and is divided into five working sections (Figure 2):

- Download and save a soil sample submission form
- Customer accounts
- Sample submission
- Data tables
- Tools

Access to Soil Sample Submission Form

A link at the top of the page provides access to the most current version of the soil sample submission form. This is a PDF form that uses drop-down menus to make filling out the form easier. Using this submission form on a computer, rather than by hand, provides legible information that is less likely to be entered incorrectly at the lab. The system works best when customers provide current and accurate email addresses and phone numbers. Customers should download the submission form and save it to their computer or have county WVU Extension staff fill in the customer information. Multiple copies can then be made for the customer to fill in the sample information as needed.

Figure 2. WVU Fertilizer Recommend System home page.

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WVU Fertilizer Recommend System

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Home Page

[Download and save a soil sample submission form](#) (a fillable PDF form with drop-down menus)

Customer Accounts

[Add a new customer account](#)
[Edit a customer account](#)
[Delete/Merge customer accounts](#)

Sample Submission

[Add a new soil sample submission](#)
[Update a soil sample submission](#)
[View an existing soil sample report](#)
[E-mail an existing soil sample report](#)

[Generate an alternative crop code report](#)

Data Tables

[Edit ANR contacts](#)

Edit Fertilizer Recommendation tables	Download Fertilizer Recommendation tables
View Customer Accounts	Download Customer Accounts
View Soil Samples Submissions	Download Soil Samples Submissions
View Alternative Crop Report List	Download Alternative Crop Report List

Tools

[Soil Test Summary Report](#)
[Value of Ag Limestone Worksheet](#)
[Blended Fertilizer Calculator Worksheet](#)
[Univ. California Davis SoilWeb](#)
[Univ. Georgia Extension Fertilizer Calculator](#)

[Logout](#)

Customer Accounts

In the customer accounts section, the user can access three activities:

- Add a new customer account (Figure 3)
- Edit a customer account (Figure 4)
- Delete/merge customer accounts (Figure 5)

Customer accounts can be accessed using their phone number, a combination of last name/zip code/first name, a combination of last name/county/first name, or their e-mail address. When using one of these methods, follow-up drop-down menu boxes will open to allow continued selection of information for the individual. The sample submission section also provides a link to the “Add a New Customer Account” section when first entering a sample submission for new customers. The delete/merge customer account feature has been used when multiple database customers are actually a single customer. Open the page and follow the directions highlighted in blue to merge accounts and delete the faulty or unneeded account.

Figure 3. Add a new customer account.

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Add a New Customer Account

WV Resident: Yes No First Name: Last Name:

Street/PO Box: City:

County: State: Zip Code:

Customer's E-mail Account: No E-mail Customer Phone Number: 304

Other E-mail addresses to receive the report:
 No E-mail(s)

[Return to Main Menu](#)

Figure 4. Edit a customer account.

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Edit a Customer Account

Look Up Customer Account By:

Last Name, Zip Code, First Name
----- Last Names ----- ▾

-OR-

Last Name, County, First Name
----- Last Names ----- ▾

-OR-

E-mail
----- Emails ----- ▾

-OR-

Phone Number
304

[Return to Main Menu](#)

Figure 5. Delete/merge customer accounts.

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Delete/Merge Accounts

Select an account to DELETE, you'll be able to pick the account with which to MERGE it on the next page.

1. Last Name, Zip Code, First Name
----- Last Names -----

-OR-

2. Last Name, County, E-mail
----- Last Names -----

-OR-

3. E-mail
----- Emails -----
Display User Info

-OR-

4. Phone Number
304 [] [] [] Display User Info

[Return to Main Menu](#)

Sample Submission

The sample submission section of the home page allows the user to accomplish five actions:

- Add a new soil sample submission (Figure 6)
- Update a soil sample submission (Figure 7)
- View an existing soil sample report (Figure 8)
- E-mail an existing soil sample report (Figure 9)
- Generate an alternative crop code report (Figure 10)

When entering a new soil sample submission, the customer account can be accessed using their phone number or by using the last name/zip code/first name lookup method. When using the latter method, input boxes open up as information is added. If the customer does not have an account, there is a link to create a new account.

Figure 6. Add a new soil sample submission.

The screenshot shows the 'Add a New Soil Sample Submission' page of the WWU Fertilizer Recommend System. The page header includes the West Virginia University logo and 'EXTENSION SERVICE' on the left, the title 'WWU Fertilizer Recommend System' in the center, and a collaboration note on the right: 'A collaboration between the WVU Davis College - Plant and Soil Sciences and the WVU Extension Service - Agriculture and Natural Resources'. The main content area is titled 'Add a New Soil Sample Submission' and 'Look Up Customer Account By:'. It features a search form with two columns: 'Last Name' and 'Zip Code First Name'. The 'Last Name' column has a dropdown menu with the text '---- Last Names ----'. Below this is a separator '-OR-'. The 'Phone:' section has three input fields, with the first containing '304'. To the right of these fields is a button labeled 'Enter a Soil Submission for This Customer'. Below the phone fields is a 'Create Account' button. At the bottom left, there is a link labeled 'Return to Main Menu'.

When updating a soil sample submission, the fastest method is to use the lab ID number for the submission. If the lab ID number is not available, the submission can be looked up using the customer's phone number or the last name/zip code/first name approach.

Figure 7. Update a soil sample submission.

The screenshot shows the 'Update a Soil Sample Submission' page of the WWU Fertilizer Recommend System. The page header includes the West Virginia University Extension Service logo and the system title. The main content area is titled 'Update a Soil Sample Submission' and 'Look Up Soil Sample Submission By:'. It provides three search methods: 1) 'Enter Last Name, Zip Code, First Name to look up Soil Sample Report' with a dropdown menu for 'Last Name' and input fields for 'Zip Code' and 'First Name'. 2) 'Use customer phone number to look up Soil Sample Report' with a 'Phone:' label, a dropdown for the area code (showing '304'), and two input fields for the remaining digits, followed by a 'Get Field IDs for This Phone Number' button. 3) 'Use Lab ID number to look up Soil Sample Report' with a 'Lab ID:' label and a dropdown menu showing '0000000000', followed by a 'Go To Sample Data' button. At the bottom left, there is a link for 'Return to Main Menu'.

When viewing a soil sample submission, the fastest methods are to use the submission lab ID number or the customer's phone number. If these are not available, the submission can be looked up using the last name/zip code/first name approach. This page provides a link to the page for creating an alternative crop code report.

Figure 8. View existing soil sample reports.

The screenshot displays the 'View Existing Soil Sample Reports' section of the 'WWU Fertilizer Recommend System'. The header includes the West Virginia University logo and the text 'A collaboration between the WVU Davis College - Plant and Soil Sciences and the WVU Extension Service - Agriculture and Natural Resources'. The main heading is 'View Existing Soil Sample Reports' followed by 'Look Up Soil Sample Submission By:'. There are two primary search methods: 1) 'Use customer phone number to look up Soil Sample Report', which includes a 'Phone:' field with a '304' area code and a 'Get Field IDs for This Phone Number' button. 2) 'Use Lab ID number to look up Soil Sample Report', which features a 'Lab ID:' dropdown menu set to '0000000000' and a large text input field for a report number, with a 'Save (any) Comments and Go To Report' button below it. A third section, 'Get Field IDs per Customer', contains 'Last Name' and 'Zip Code First Name' dropdown menus. At the bottom, there is a 'Create a Report for Alternative Crop Code' section with 'Lab ID' and 'Crop Code' dropdowns, and a 'Return to Main Menu' link.

When emailing a report, the report will be sent to the customer and any others the customer has noted on the submission form, as well as to the WVU Extension agent responsible for answering questions regarding crop fertilization recommendations for the county the customer resides in. When preparing to email a report, the user can first view the report to ensure it is ready to go, then page back using the left arrow on the web page. This page will then repopulate the lab ID number, and the report can be sent.

Figure 9. E-mail existing soil sample reports.

The screenshot shows the 'E-mail Existing Soil Sample Reports' page of the WWU Fertilizer Recommend System. The page has a dark blue header with the West Virginia University logo and text: 'West Virginia University. EXTENSION SERVICE', 'WWU Fertilizer Recommend System', and 'A collaboration between the WVU Davis College - Plant and Soil Sciences and the WVU Extension Service - Agriculture and Natural Resources'. The main content area is white and contains the following sections:

- E-mail Existing Soil Sample Reports**
- Select the Soil Sample Report**
- Enter Last Name, Zip Code, First Name to look up Soil Sample Report**
 - Labels: Last Name, Zip Code, First Name
 - Input: A dropdown menu for 'Last Name' with the text '---- Last Names ----' and a downward arrow.
- Use customer phone number to look up Soil Sample Report**
 - Label: Phone:
 - Input: Three text boxes, the first containing '304'.
 - Button: 'Get Field IDs for This Phone Number'
- Use Lab ID number to look up Soil Sample Report**
 - Label: Lab ID:
 - Input: A dropdown menu with the value '0000000000' and a downward arrow.
 - Buttons: 'View Report' (highlighted in green) and 'E-mail Report'.
- [Return to Main Menu](#)

A soil test submission can be used to generate fertilizer recommendations for alternative crops using the “Create an alternative crop code report” page. New reports can be saved as a PDF document, but the original crop code will be maintained in the submission database and a short note will be saved telling the administrators what alternative reports were produced and who produced them.

Figure 10. Create an alternative crop code report.

The screenshot shows the 'WWU Fertilizer Recommend System' interface. At the top left is the West Virginia University logo and 'EXTENSION SERVICE'. At the top right is the text 'A collaboration between the WVU Davis College - Plant and Soil Sciences and the WVU Extension Service - Agriculture and Natural Resources'. The main heading is 'WWU Fertilizer Recommend System'. Below this, the instruction reads: 'Create an alternative crop code report using the following submission:'. There are two dropdown menus: 'Lab ID' with the value '0000000000' and 'Crop Code'. A horizontal line separates this from the next section, which has two dropdown menus: 'Last Name' with the value '---- Last Names ----' and 'Zip Code First Name'. At the bottom left, there is a link that says 'Return to Main Menu'.

Data Tables

The data tables section of the home page provides links to nine sections used to manage the system, view data tables in spreadsheet form, edit the data tables used for making fertilizer recommendations and download data tables for use outside of the recommendation software.

The nine sections are:

- Edit ANR contacts (Figure 11)
- Edit fertilization recommend data tables (Figure 12)
- View customer accounts
- View soil sample submissions
- View alternative crop report list
- Download fertilizer recommendation data tables (Figure 13)
- Download customer accounts
- Download soil sample submissions
- Download alternative crop report list

Figure 11. An example of part of the Edit ANR contacts data table.

County	Agent Name	E-mail	Phone	Position	County E-mail	
Barbour County	Jody Carpenter	jcarpe11@mail.wvu.edu	(304) 636-2455	ANR Faculty	BarbourCountyExtension@mail.wvu.edu	Update
Berkeley County	Mary Beth Bennett	MBBennett@mail.wvu.edu	(304) 264-1936	ANR Faculty	BerkeleyCountyExtension@mail.wvu.edu	Update
Boone County	David R. Richmond	david.richmond@mail.wvu.edu	(304) 255-9321	No ANR Agent	BooneCountyExtension@mail.wvu.edu	Update
Braxton County	Debra P. Friend	debbie.friend@mail.wvu.edu	(304) 765-2809	ANR Faculty	BraxtonCountyExtension@mail.wvu.edu	Update
Brooke County	Karen G. Cox	karen.cox@mail.wvu.edu	(304) 234-3673	ANR Faculty	BrookeCountyExtension@mail.wvu.edu	Update
Cabell County	Evan Wilson	jewilson@mail.wvu.edu	(304) 272-6839	ANR Faculty	CabellCountyExtension@mail.wvu.edu	Update
Calhoun County	Daisy F. Bailey	dmfryman@mail.wvu.edu	(304) 462-7061	No ANR Agent	CalhounCountyExtension@mail.wvu.edu	Update
Clay County	Michael D. Shamblin	michael.shamblin@mail.wvu.edu	(304) 587-4267	ANR Faculty	ClayCountyExtension@mail.wvu.edu	Update
Doddridge County	Jeremy Moore	jmoore64@mail.wvu.edu	(304) 873-1801	County funded program assistant	DoddridgeCountyExtension@mail.wvu.edu	Update
Fayette County	Brian R. Sparks	brian_sparks@mail.wvu.edu	(304) 872-	ANR Faculty	FayetteCountyExtension@mail.wvu.edu	Update

The “Edit fertilizer recommendation data table” section allows for updating of crop code notes, fertilizer recommendations and the other data tables that control the production of the recommendation report.

Figure 12. Edit fertilization recommend data tables.



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Edit Fertilizer Recommendation data tables

- [EDIT Crop Code Notes](#)
- [EDIT Fertilizer Recommendations](#)
- [EDIT Soil Series and Crop Yield Classes](#)
- [EDIT Expected Crop Yield by Yield Classes](#)
- [EDIT Crop Codes vs Crop Classes](#)
- [EDIT Relative Soil Fertility](#)
- [EDIT Psat Information](#)
- [EDIT pH-Mg Information](#)
- [EDIT EC Table](#)

[Return to Soil Test Admin page](#)

Figure 12 A. Edit crop code notes (example at the top of the table).

West Virginia University EXTENSION SERVICE		WVU Fertilizer Recommend System		A collaboration between the WVU Davis College - Plant and Soil Sciences and the WVU Extension Service - Agriculture and Natural Resources	
Crop Codes with Notes					
Return to Admin page					
Crop Code	Crop	Note	Order		
<input type="text" value="C01"/>	Grass-Clover Hay	Fertilizer recommendations are for topdressing an established stand, based on the indicated yield, with pH adjusted to 6.0 or above, and soil samples take to a 2-inch depth.	<input type="text" value="1"/>	<input type="button" value="Update"/>	<input type="button" value="Delete"/>
<input type="text" value="C01"/>	Grass-Clover Hay	Apply the recommended fertilizer rates annually.	<input type="text" value="2"/>	<input type="button" value="Update"/>	<input type="button" value="Delete"/>
<input type="text" value="C01"/>	Grass-Clover Hay	When taking fewer than 3 hay harvest/year reduce P205 and K20 applications to 12 lbs. P205 and 45 lbs. K20/ton of hay harvested/acre. For example if only making one cut of hay and hay harvested was 2	<input type="text" value="2"/>	<input type="button" value="Update"/>	<input type="button" value="Delete"/>
<input type="text" value="C01"/>	Grass-Clover Hay	When yields are lower than indicated yield apply P205 and K20 in proportion to actual yield. When taking only 1 cut of hay yielding 2 tons/acre but recommendations are for 4 tons, reduce P205 and K20 to	<input type="text" value="3"/>	<input type="button" value="Update"/>	<input type="button" value="Delete"/>
<input type="text" value="C01"/>	Grass-Clover Hay	Soils testing below Optimum should be tested each fall to tract improvement in soil test values.	<input type="text" value="4"/>	<input type="button" value="Update"/>	<input type="button" value="Delete"/>
		Soils testing in the Optimum range, receiving annual maintenance		<input type="button" value="Update"/>	

Figure 12 B. Edit fertilizer recommendations (example at the top of the table).

West Virginia University EXTENSION SERVICE		WVU Fertilizer Recommend System		A collaboration between the WVU Davis College - Plant and Soil Sciences and the WVU Extension Service - Agriculture and Natural Resources						
Fertilizer Recommendations Table										
Return to Admin page										
	Crop Code	Crop Name	Yield Goal	Unit Yield Weight	N/Acre/Year	Soil Test Level	Minimum Sufficiency Fertilization Rate P ₂ O ₅ /Acre/Year	Build to Optimum and Maintenance P ₂ O ₅ /Acre/Year	Minimum Sufficiency Fertilization Rate K ₂ O/Acre/Year	Build to Optimum and Maintenance K ₂ O/Acre/Year
<input type="button" value="Update"/> <input type="button" value="Delete"/>	<input type="text" value="C01"/>	Grass-Clover Hay	<input type="text" value="4"/>	<input type="text" value="2000"/>	<input type="text" value="0"/>	Low - <input type="button" value="v"/>	<input type="text" value="135"/>	<input type="text" value="135"/>	<input type="text" value="235"/>	<input type="text" value="265"/>
<input type="button" value="Update"/> <input type="button" value="Delete"/>	<input type="text" value="C01"/>	Grass-Clover Hay	<input type="text" value="4"/>	<input type="text" value="2000"/>	<input type="text" value="0"/>	Low <input type="button" value="v"/>	<input type="text" value="110"/>	<input type="text" value="120"/>	<input type="text" value="220"/>	<input type="text" value="250"/>
<input type="button" value="Update"/> <input type="button" value="Delete"/>	<input type="text" value="C01"/>	Grass-Clover Hay	<input type="text" value="4"/>	<input type="text" value="2000"/>	<input type="text" value="0"/>	Low + <input type="button" value="v"/>	<input type="text" value="90"/>	<input type="text" value="105"/>	<input type="text" value="200"/>	<input type="text" value="235"/>
<input type="button" value="Update"/> <input type="button" value="Delete"/>	<input type="text" value="C01"/>	Grass-Clover Hay	<input type="text" value="4"/>	<input type="text" value="2000"/>	<input type="text" value="0"/>	Medium - <input type="button" value="v"/>	<input type="text" value="65"/>	<input type="text" value="90"/>	<input type="text" value="185"/>	<input type="text" value="220"/>

Figure 12 C. Edit soil series and crop yield classes (example at the top of the table).

West Virginia University. EXTENSION SERVICE										WVU Fertilizer Recommend System		A collaboration between the WVU Davis College - Plant and Soil Sciences and the WVU Extension Service - Agriculture and Natural Resources	
Soil Series and Crop Yield Classes													
Return to Admin page													
Soil Series	Soil Mgt Group	Corn	Grain Sorghum	Small Grain	Soybeans	Alfalfa	Grass, Clover, Hay, Pasture	Sensitivity	Limitation				
Airmont	BB	IVb	IVb	III	IV	NS*	III	M	Wetness	Update			
										Delete			
Albrights	BB	IVb	IVb	III	IV	NS*	III	M	Wetness	Update			
										Delete			
Albrights (drained)	W	IVa	IVa	IV	III	NS*	IV	H	Drainage	Update			
										Delete			
Allegheny	L	IIb	IIb	I	II	III	II	L	-	Update			
										Delete			
Alluvial Land, wet	NN	V	V	V	V	NS*	IV	M	Leaching	Update			

Figure 12 D. Edit expected crop yield by yield class (example of the top of the table).

West Virginia University. EXTENSION SERVICE										WVU Fertilizer Recommend System		A collaboration between the WVU Davis College - Plant and Soil Sciences and the WVU Extension Service - Agriculture and Natural Resources	
Expected Crop Yield by Yield Classes													
Return to Admin page													
Crop Code	Crop	Yield Units	DM %	I	II	III	IV	V					
C01	Grass-Clover Hay	Tons/A	90	4	4	3.5	3	3	Update				
									Delete				
C02	Grass Hay N-Fertilized	Tons/A	90	5	4.5	4	3.5	3	Update				
									Delete				
C03	Alfalfa and Alfalfa-grass Hay	Tons/A	90	6	5	4	3	3	Update				
									Delete				
C04	Bermudagrass Hay	Tons/A	90	6	5.5	4.5	3.5	3	Update				
									Delete				
C05	Grass-Clover Pasture or Ro	AUM	0	7	7	6.1	5.2	5.2	Update				
									Delete				
									Update				

Figure 12 E. Edit crop codes vs crop classes (example at the top of the table).



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Crop Codes vs Crop Classes

[Return to Admin page](#)

Crop Code	Crop	Crop Class	
C01	Grass-Clover Hay	Grass_Clover_Hay_Pasture	Update Delete
C02	Grass Hay N-Fertilized	Grass_Clover_Hay_Pasture	Update Delete
C03	Alfalfa and Alfalfa-grass Hay	Alfalfa	Update Delete
C04	Bermudagrass Hay	Grass_Clover_Hay_Pasture	Update Delete
C05	Grass-Clover Pasture	Grass_Clover_Hay_Pasture	Update Delete
			Update

Figure 12 F. Edit relative soil fertility.



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Relative Soil Fertility (Values in cells represent the low end of the relative rating range for that nutrient)

[Return to Admin page](#)

Rating	P	K	Ca	Mg	
Low -	0	0	0	0	Update
Low	5	15	200	25	Update
Low +	10	30	400	50	Update
Medium -	15	45	600	75	Update
Medium	20	60	800	100	Update
Medium +	25	75	1000	125	Update
Optimum -	30	90	1200	150	Update
Optimum	40	120	1600	200	Update
Optimum +	50	150	2000	250	Update
Excess	60	180	2400	300	Update

Figure 12 G. Edit Psat information.



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Psat Information

[Return to Admin page](#)

Rating	Upper Bound	Note	
Low	<input type="text" value="15.000"/>	Your soil phosphorus concentration is not high enough to be of environmental concern. Be sure to follow the P recommendation provided in your soil test report.	<input type="button" value="Update"/>
Medium	<input type="text" value="25.000"/>	Your soil phosphorus concentration is near the level to be of environmental concern. There is unlikely to be a benefit to more P fertilizer than will be removed by your crop.	<input type="button" value="Update"/>
High	<input type="text" value="100.000"/>	Your soil phosphorus concentrations are well above the level for environmental concern. Do not apply additional P fertilizer and implement strategies to reduce your soil test P concentration.	<input type="button" value="Update"/>

Figure 12 H. Edit pH-Mg information.



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pH-Mg Information

[Return to Admin page](#)

pH Lower Bound	pH Upper Bound	Note	
<input style="width: 100%;" type="text" value="6.000"/>	<input style="width: 100%;" type="text" value="6.499"/>	This soil sample has a pH of 6.0 or greater but tests below optimum in magnesium (Mg). It is recommended that bulk dolomitic lime (1 ton/acre) or pelleted dolomitic lime (12% Mg, 500 lbs/acre) be used to meet the crop's Mg requirement and raise the soil test Mg into or toward the optimum range.	<input type="button" value="Update"/>
<input style="width: 100%;" type="text" value="6.500"/>	<input style="width: 100%;" type="text" value="6.999"/>	This soil sample has a pH of 6.5 or greater but tests below optimum in magnesium (Mg). It is recommended that bulk dolomitic lime (1 ton/acre), pelleted dolomitic lime (12% Mg, 500 lbs/acre), Mg oxide (60% Mg, 60 lbs./acre), Epsom Salts (Mg sulfate, 10% Mg, 350 lbs./acre) or potassium Mg sulfate fertilizer (0-0-22, 11% Mg, at the rate to meet the potassium recommendation) be used to meet the crop's Mg requirement and raise the soil test Mg into or toward the optimum range.	<input type="button" value="Update"/>
<input style="width: 100%;" type="text" value="7.000"/>	<input style="width: 100%;" type="text" value="14.000"/>	This soil sample has a pH or 7.0 or greater but tests below optimum in magnesium (Mg). It is recommended that Mg oxide (60% Mg, 60 lbs./acre), Epsom Salts (Mg sulfate, 10% Mg, 350 lbs./acre) or potassium Mg sulfate fertilizers (0-0-22, 11% Mg, at the rate to meet the potassium recommendation) be used to meet crop's Mg requirement and raise the soil test Mg into or toward the optimum range.	<input type="button" value="Update"/>

Figure 12 I. Electrical conductivity (EC) notes table.

West Virginia University EXTENSION SERVICE		WVU Fertilizer Recommend System		A collaboration between the WVU Davis College - Plant and Soil Sciences and the WVU Extension Service - Agriculture and Natural Resources	
Edit EC data table					
ID	Lower_TH	Sensitivity	Crop	Action	
1	EC	Note title heading	When the reported EC value is greater than the Lower Threshold (TH) number in the first column the crop may suffer yield loss due to excess salts	Update	
2	0.7	Sensitive	Bean, Carrot, Onion (bulb), Pigeon pea, Strawberry, Parsnip	Update	
3	1.5	Mostly Sensitive	Broccoli, Cabbage, Cauliflower, Celery, Corn, Cucumber, Eggplant, Garlic, Kale, Kohlrabi, Lettuce, Musk melon, Okra, Onion (seed), Pea, Pepper, Potato, Pumpkin, Radish, Spinach, Squash, Sweet potato, Tomato, Turnip, Brussels sprouts, Water melon , Cauliflower, Kale, Kohlrabi, Pumpkin, Water melon	Update	
4	3.0	Mostly Tolerant	Artichoke, Beet, red, Cowpea, Purslane, Squash, zucchini, Winged bean, Bean, lima	Update	
5	4.5	Tolerant	Asparagus	Update	
				Add New	

Figure 13. Download fertilizer recommendation data tables.

West Virginia University EXTENSION SERVICE		WVU Fertilizer Recommend System		A collaboration between the WVU Davis College - Plant and Soil Sciences and the WVU Extension Service - Agriculture and Natural Resources	
Download Fertilizer Recommendation Data tables as spreadsheets					
Crop Code Notes					
Fertilizer Recommendations					
Soil Series and Crop Yield Classes					
Expected Crop Yield by Yield Classes					
Crop Codes vs Crop Classes					
Relative Soil Fertility					
Psat Information					
Return to Soil Test Admin page					

The data tables can be downloaded as Excel spreadsheets for use outside of the system (Figure 13). Following the links on this page will allow the user to download the individual tables and be saved to the user's computer.

Appendix tables at the end of this document provide all the data tables other than those containing customer information for viewing offline. Downloading customer accounts, soil sample submissions and alternative crop reports is accomplished by following the links and assigning where your computer is to save the spreadsheets.

Tools

The Tools section of the home page provides access to web-based tools useful for summarizing soil test values and for implementing fertilizer recommendations. These include:

- Soil test summary report
- Value of ag limestone tool
- Blended fertilizer calculator
- University of California, Davis SoilWeb
- University of Georgia Extension fertilizer calculator

Figure 14 A. Soil test summary report input page and an example of a summary report.

West Virginia University
EXTENSION SERVICE

WVU-ES Soil Test Summary Report

----- Select a county ----- ▾ ----- Select a crop code ----- ▾ Start Date:  End Date: 

[Return to Main Menu](#)

Figure 14 B. Soil test summary report output.

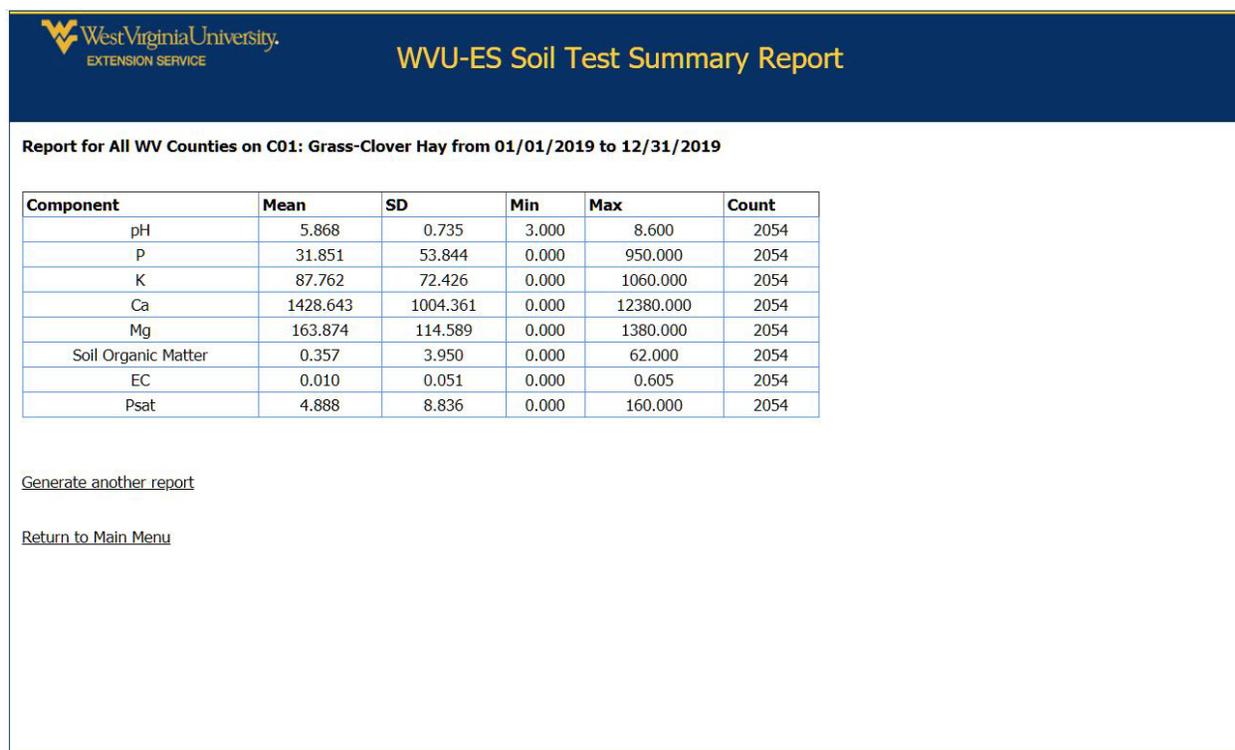


Figure 15. Value of ag limestone worksheet allows comparing the value of up to three limestone products at one time.

WVU Extension Service Ag Limestone Tool

This tool can be used in two ways.

- 1. To evaluate different ag. limestone sources based on their total neutralizing value (TNV) as calcium carbonate equivalence (CCE) and effective neutralizing value (ENV) due to fineness of the lime.**
- 2. To calculate the tons of as labelled limestone/acre needed to achieve the recommended 100% ENV lime/acre**

Enter name and values associated with the limestone sources in the blue boxes or the names of the fields and their soil test recommended ENV lime/acre. Use equivalent lime costs, either delivered only or delivered and spread. The TNV or CCE values and the portion of the lime passing specified screen mesh sizes can be found on the label of the limestone purchased. Add the magnesium carbonate (MgCO₃) content of the limestone from the limestone label. The limestone label is available to the purchaser as required by WVDA. The lime recommendation is as reported by the WVU soil testing laboratory as tons of ENV limestone.

[Ag Limestone Spreadsheet](#)

Compare tons of ENV limestone for up to 3 limestone labels ▼

Limestone Source Cost Comparison			
Name of Limestone Brand	High Magnesium Lime		
Cost/ton lime	\$ 34.00	\$	\$
TNV in CCE (from lime label)	1.056		
Limestone magnesium carbonate (MgCO ₃) percent (from lime label)	0		
Lime Requirement tons/acre ENV lime (from WVU soil test)	2.0		
Tons of lime needed based on CCE			
Cost/acre based on CCE			
Screen mesh:	Fraction Passing Screen Mesh (from label)		
100	0.75		
60	0.85		
20	1.00		
Lime effectiveness based on fineness	Adjustment for sieve size classes		
>60 100%			
20-60 50%			
Total lime effectiveness			
ENV			
Tons of lime needed based on ENV			
Elemental Mg applied lbs./acre			
Cost/acre based on ENV			

If you have questions, contact your County Agent whose contact information is listed on your soil test report.

Figure 16. Blended fertilizer calculator worksheet allows calculating the amount of basic fertilizer to use per acre or per 100 square feet based on a soil test report.

WVU-ES Blended Fertilizer Calculator

Enter data in blue cells.

<input checked="" type="radio"/> Pounds of plant nutrients to be applied/acre <input type="radio"/> Ounces of plant nutrients to be applied/100 sq. feet	N	P ₂ O ₅	K ₂ O
	?		
Fertilizer bulk prices	\$/ton		
Urea	\$ 0		
DAP	\$		
KCl	\$		

Fertilizer	Blend fertilizer mix lbs./ton	Cost
Urea	0	\$0.00
DAP	0	\$0.00
KCl	0	\$0.00
Total	0	\$0.00

Application Rate lbs. fertilizer/acre	0
Fertilizer cost/acre	\$0.00

CALCULATE

Programs and activities offered by the West Virginia University Extension Service are available to all persons without regard to race, color, sex, disability, religion, age, veteran status, political beliefs, sexual orientation, national origin, and marital or family status. Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30 , 1914, in cooperation with the U.S. Department of Agriculture. Director, Cooperative Extension Service, West Virginia University.

Figure 17. University of California, Davis SoilWeb home page.

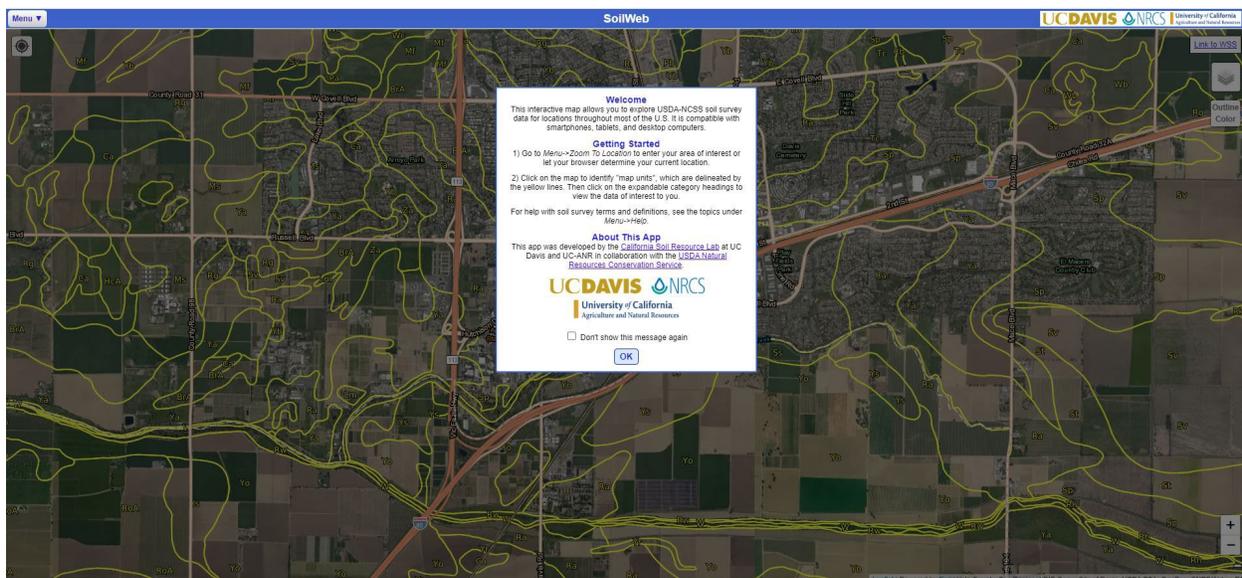


Figure 18. University of Georgia Extension Fertilizer Calculator is a more detailed tool for blending or comparing fertilizer options.



UNIVERSITY OF GEORGIA
EXTENSION

**Agricultural & Environmental
Services Laboratories**

SPW: 706-542-5350
FEW: 706-542-7690
CEQ: 706-542-9023
Contact: soiltest@uga.edu

Fertilizer Calculator
N-P₂O₅-K₂O
R. Hitchcock and D. E. Kissel

The University of Georgia Fertilizer Calculator was developed to assist users whose fertilizer needs require adjustment from the standard soil test recommendation due to a change in units, availability of fertilizer products, and/or a difference in land size. The calculator ranks various fertilizer combinations, with the best getting the highest score.

You can use it to:

- Calculate the weight of fertilizer materials to supply the amounts of N, P₂O₅, and K₂O recommended by a soil test report.
- Select recommendations in pounds per acre that are typical of agronomic crop recommendations or in pounds per 1000 square feet that are typical of homeowners reports such as for a home lawn.
- Select fertilizer grades different from those given in the recommendation. This is useful when the fertilizer grades in the test report are not available locally.
- Calculate the area of a garden or lawn given the dimensions and shape of the area to be fertilized.
- Calculate fertilizer costs.

Use this calculator to ...

Convert fertilizer recommendations between pounds per acre and pounds per square feet.

List alternative recommendations when fertilizer grades are not available.

Get recommendations based on the specific area to be fertilized.

Calculate fertilizer costs.

Step 1. Enter fertilizer requirements

Fertilizer recommendations are given in:

pounds per acre
 a specific grade (such as 10-10-10)

Recommendation from soil test report			Application
N	P ₂ O ₅	K ₂ O	
			pounds per acre
0.00	0.00	0.00	pounds per 1000 square feet

Step 2. Select available grades

Choose from the list of commonly-available grades, or add your own in N-P₂O₅-K₂O format.

Show grades for:

Lawns and Gardens
 Farm use

<input type="checkbox"/> 29-0-5 <input type="checkbox"/> 18-24-6 <input type="checkbox"/> 10-10-10 <input type="checkbox"/> 14-7-7 <input type="checkbox"/> 10-5-4 <input type="checkbox"/> 32-0-8 <input type="checkbox"/> 1-15-0 Bone Meal <input type="checkbox"/> 7-2-2 <input type="checkbox"/> 5-6-3 <input type="checkbox"/> 5-5-5 Plant Food <input type="checkbox"/> 0-10-10 <input type="checkbox"/> 5-5-3 <input type="checkbox"/> 4-5-3 Tomato Veg Food	<input type="checkbox"/> 7-3-3 <input type="checkbox"/> 4-6-2 <input type="checkbox"/> 18-0-3 <input type="checkbox"/> 10-0-6 <input type="checkbox"/> 4-3-4 <input type="checkbox"/> 15-0-15 <input type="checkbox"/> 6-2-1 Cottonseed Meal <input type="checkbox"/> 13-0-0 Blood Meal <input type="checkbox"/> 3-4-4 Garden Tone <input type="checkbox"/> 6-8-0 Bone Meal <input type="checkbox"/> 12-0-0 Blood Meal <input type="checkbox"/> 9-23-30
---	--

Fertilizer grades (N-P ₂ O ₅ -K ₂ O)	\$ Cost per pound

Step 3. Choose application rate and area

pounds per 1000 square feet

If the area is unknown, what shape best describes the area to be fertilized?

Options

Show all scores

Number of grades to use in recommendation: 2

Round recommendations to nearest:

Tenth Quarter Half Whole number

How a crop fertilizer recommendation is made

To describe how the fertilizer recommendation system works, the example of a new customer submitting their first soil sample will be used.

The customer downloads the sample submission form and uses the drop-down menus to fill out the form for their soil sample. They attach the submission form to the plastic bag holding the soil sample with a rubber band (not a staple) and submit the sample to soil testing laboratory as instructed on the submission form.

The soil testing lab processes the soil sample according to the laboratory protocol and starts to enter the laboratory values into the submission data base. The technician goes to the “Sample Submission” section of the home page and clicks on “Add a new soil sample submission.” In looking up the customer’s account, they find that this is a new customer who does not have an account. They then click on the “Create Account” button to go to the “Add a New Customer Account” page and create the account.

After creating the new customer account, the technician clicks on the “Create Account & Go to Sample Submission” button. In the sample submission section, the laboratory data is entered in the appropriate boxes. Data for extracted minerals are entered as elemental nutrients in milligrams per liter of Mehlich 3 extract, measured using the ICP output units. These values are multiplied by 10 to convert mg/L to parts per million (ppm) of soil when the report is generated and reported as elemental ppm on the soil test report sent to the customer. The technician then has three option buttons:

- Save & Add Another Sample for this Customer
- Save & Choose Another Customer
- Save & Return to Main Menu

At this point, the soil sample has been analyzed and data entered into the system database. If the submission data needs to be updated or viewed, those options are provided under “Sample Submission” on the homepage.

Once everything is in order the report can be emailed to the customer, if they provided an email address. The report is also emailed to the county agent responsible for fertilizer recommendations for the county where the customer resides. If the customer did not provide an email address, county staff will mail a printed copy of the soil test report to the customer.

Fertilizer Recommendation

The fertilizer recommendation is generated by the computer at the time the report is being emailed to the customer. For agronomic crops (crop codes C01 to C21), the computer takes the crop code and reported soil series and uses the soil series and crop yield classes data table to determine the crop yield class for this crop on this soil. If no soil series is provided, the default crop yield will be a class 2 yield. Using the crop code and the crop yield class, the expected yield is looked up in the expected crop yield by yield classes data table. The data tables used in producing the soil test report can be viewed in and downloaded from the fertilizer recommendation system.

Using the relative soil fertility data table, the extracted P and K in elemental ppm are converted to the relative soil test levels: low-, low, low+, medium-, medium, medium+, optimum-, optimum, optimum+, and excess.

Using crop code and relative soil fertility level, the N, P and K fertilizer recommendations are looked up for the default yield in the fertilizer recommendations data table. Two recommended fertilization rates are provided: minimum sufficiency, and build to optimum and maintenance.

The minimum sufficiency rate is the lowest amount of P and K fertilizer needed by this crop to achieve the indicated yield, plus a little extra to raise the soil test for this nutrient into the medium range. If this fertilizer is not applied, yields will be below the indicated yield due to the lack of the fertilizer nutrient. This recommendation is provided for use on rental property that is governed by an annual rental agreement or for years when fertilizer prices are excessively high.

The build to optimum and maintenance rate is provided for use on property that is owned or held with a long-term lease. Use of this recommendation will build soil fertility into the optimum

range, where soil fertility on livestock farms can be maintained primarily by cycling nutrients in manures produced on the farm. In years when fertilizer prices are high, no added P or K fertilizer is needed when nutrients are properly managed.

When a soil series is provided and the crop yield class for the soil series differs from the default yield, P and K fertilizer recommendations are adjusted in proportion to the yield difference. If the expected yield is 10% higher, P and K recommendations are increased by 10%. If the expected yield is 20% lower, P and K recommendations are decreased by 20%. This rule is applied to N fertilization recommendations for corn and small grain crops. For hay crops, the N fertilization rule is 50 to 60 pounds of actual N per acre per hay harvest for a total of 50 to 200 pounds of N per acre per year. For grass-legume hay and pasture, no N is recommended since the desired management is to have legumes provide the N to the crop.

For non-agronomic crops, only one expected yield class is used and only one fertilizer recommendation is provided. This recommendation is based on the crop and relative soil fertility. For home horticultural crops and wildlife food plots, updated WVU recommendations are used. For commercial vegetable crops (crop codes V01 to V46), the Mid-Atlantic Commercial Vegetable crop recommendations are used. The single recommendation is provided in both fertilizer recommendation sections of the report.

Crop code is used to attach crop code notes to page two of the soil test report. These notes are maintained in and retrieved from the crop code notes table.

Lime recommendations are divided into two classes. For alfalfa crop codes, the lime recommendation is based on soil test buffer pH and the amount of effective neutralizing value (ENV) lime required to bring the pH to 6.6. A maximum recommendation of 3 tons of ENV lime per acre is made. For all other crops, except blueberries and brambles, no lime is recommended if the pH is 6.0 or greater. When the pH drops below 6.0 for agronomic crops other than alfalfa, the lime recommendation is 2 tons ENV lime per acre. A lime evaluation tool is provided on the web for county agents and farmers to use to calculate the ENV of a liming product: https://extapps.wvu.edu/soiltesting/ag_limestone_value.cfm

When soil test Mg is below optimum and soil pH calls for the application of lime, high Mg (dolomitic) lime is recommended. For soils not needing an adjustment in pH, alternative recommendations for Mg management are provided as notes from the pH-Mg information table.

When electrical conductivity (EC) measurement is requested and reported, an EC note is attached to the report as maintained in the EC data table.

For each soil sample submission, a Psat ratio is calculated, and a note is applied to the report from the Psat Information data table describing the potential environmental impact of this value.

Figure 19. Example of a new sample submission automatically populated with the customer's information.



West Virginia University
EXTENSION SERVICE

WVU Fertilizer Recommend System

A collaboration between the
WVU Davis College - Plant and Soil Sciences and the
WVU Extension Service - Agriculture and Natural Resources

WEST VIRGINIA UNIVERSITY, DAVIS COLLEGE
THE WVU SOIL TESTING LABORATORY, MORGANTOWN, WV 26506 - 6108
SOIL SAMPLE SUBMISSION FORM

CUSTOMER DATA

WV Resident: Yes No First Name: Last Name:

Street/PO Box: City:

County: State: Zip Code:

Customer's E-mail Account: Customer Phone Number:

Other E-mail addresses to receive the report:

SAMPLE SUBMISSION

Sample Date: (mm/dd/yyyy)

Customer Sample ID: County where the sample was taken: Previous management (crop, cover):

Cost Share Program Participant? Yes No Organic grower? Yes No Soil limed within last 12 months? Yes No Organic Matter (Additional Cost \$6)? Yes No

Extent of the area sampled: Acres Or Sq. Feet Predominant Soil Series:

Crop Codes: Soil Texture Codes: Tillage Codes:

Additional Information:

FOR LABORATORY USE ONLY

WVU Lab ID: Date received: (mm/dd/yyyy) Sample Quality:

pH Buffer pH Mg (mg/L)

Ca (mg/L) K (mg/L) Na (mg/L)

P (mg/L) B (mg/L) Zn (mg/L)

Fe (mg/L) Al (mg/L) Organic Matter (mg/Kg)

EC (dS/m)

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Figure 20. Example of an updated sample submission showing customer, sample and laboratory data.



WVU Fertilizer Recommend System

A collaboration between the
 WVU Davis College - Plant and Soil Sciences and the
 WVU Extension Service - Agriculture and Natural Resources

WEST VIRGINIA UNIVERSITY, DAVIS COLLEGE
 THE WVU SOIL TESTING LABORATORY, MORGANTOWN, WV 26506 - 6108
 SOIL SAMPLE SUBMISSION FORM

UPDATE A SAMPLE SUBMISSION

CUSTOMER DATA

WV Resident: Yes No
 First Name:
 Last Name:

Street/PO Box:
 City:

County:
 State:
 Zip Code:

Customer's E-mail Account:
 Customer Phone Number:

Other E-mail addresses to receive the report:

SAMPLE DATA

Customer Sample ID:
 Sample Date:

County where the sample was taken:
 Previous management (crop, cover):

Cost Share Program Participant? Yes No
 Organic grower? Yes No
 Soil limed within last 12 months? Yes No
 Organic Matter (Additional Cost \$6)? Yes No

Extent of the area sampled: Acres Or Sq. Feet
 Predominant Soil Series (if known):

Crop Codes:
 Soil Texture Codes:

Tillage Codes:

Additional Information:

Laboratory Analysis (Nominal and ICP units)

WVU Lab ID:
 Date received:
 Sample Quality:

(mm/dd/yyyy)

pH <input type="text" value="5.900"/>	Buffer pH <input type="text" value="6.300"/>	Mg <input type="text" value="7.500"/> (mg/L)
Ca <input type="text" value="270.000"/> (mg/L)	K <input type="text" value="9.300"/> (mg/L)	Na <input type="text" value="1.000"/> (mg/L)
P <input type="text" value="2.500"/> (mg/L)	B <input type="text" value="1.000"/> (mg/L)	Zn <input type="text" value="1.000"/> (mg/L)
Fe <input type="text" value="15.000"/> (mg/L)	Al <input type="text" value="13.000"/> (mg/L)	Organic Matter <input type="text" value="45"/> (mg/Kg)
EC <input type="text" value="0.000"/> (dS/m)	Lime Requirement <input type="text" value="2.0"/>	Psat <input type="text" value="8.929"/>

[Return to Main Menu](#)

Figure 21. Example of the front page of the WVU soil test report using data from Figure 20.

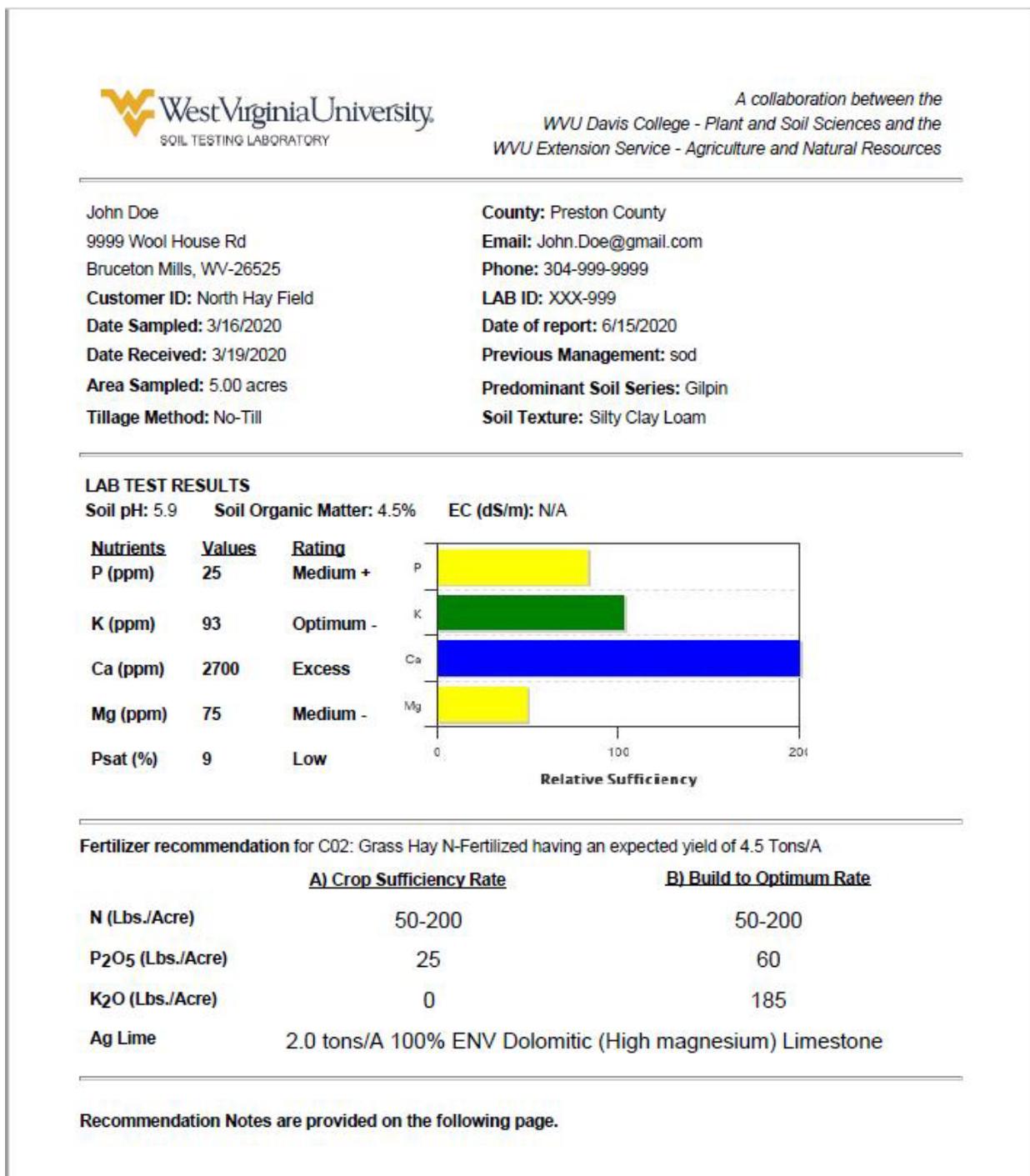


Figure 22. Example of the back page of the WVU soil test report using data from Figure 20.

Recommendation Notes:

- * Split N applications using 50-60 lbs. N/A/harvest. Reduce expected yield by 10-12% for each 50 lbs. N/A applied below maximum recommended N rate.
- * Applying 50-60 lbs. N/A after last harvest in mid to late September will stimulate tiller bud development and provide N for first harvest the following year.
- * When yields are lower than indicated yield apply P2O5 and K2O in proportion to actual yield. When taking only 1 cut of hay yielding 2 tons/acre but recommendations are for 4 tons, reduce P2O5 and K2O to
- * Fertilizer recommendations are for topdressing an established stand, based on the indicated yield, with pH adjusted to 6.0 or above, and soil samples take to a 2-inch depth.
- * Apply the recommended fertilizer rates annually.
- * Soils testing below Optimum should be tested each fall to tract improvement in soil test values.
- * Soils testing in the Optimum range, receiving annual maintenance applications, should be tested every 3 years.
- * Fertilizer recommends are for addition of plant nutrients from all sources. Use manures and crop residues to build and maintain soil fertility as much as possible.

Your soil phosphorus concentration is not high enough to be of environmental concern. Be sure to follow the P recommendation provided in your soil test report.

If you have questions about the fertilizer recommendations in this report contact your local ANR county agent, **William L. Shockey**, at (304) 329-1391 or bill.shockey@mail.wvu.edu.

Additional Landowner Information:

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