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INTRODUCTION

Fertilizers support plant growth and productivity, thereby improving farmer livelihood and regional and national food security. In the State of Connecticut, the Agricultural Commodities Division of the Department of Agriculture is responsible for the regulation and inspection of commercial fertilizer products. A sampling of these products is delivered to The Connecticut Agricultural Experiment Station for analysis to ensure label compliance.

METHODS

After delivery to The Connecticut Agricultural Experiment Station these products were sub-sampled and prepared for analysis. Samples Fert24-003 to Fert24-030 were collected in small packages, while Fert24-031 to Fert24-041 were collected with a trier from bulk packaging. The samples were analyzed for nitrogen (N), phosphorus (P; as P_2O_5) and potassium (K; as K_2O) using standard analytical methods. In some cases, secondary and micronutrient (Ca, S, Fe, B, Co, Cu, Mg, Mn, Mo Zn) analysis is requested. The nitrogen content is determined using a Leco FP-828 combustion analyzer. Nutrients, such as P, K, secondary and micronutrients are readied for analysis by hot nitric acid digestion using a SCP Sciences Hot Block then determined using a Thermo Scientific iCAP PRO Inductively Coupled Plasma-Optical Emission Spectroscopy (ICP-OES).

RESULTS AND DISCUSSION

From January 1, 2024, to December 31, 2024, the Department of Analytical Chemistry at The Connecticut Agricultural Experiment Station analyzed 41 fertilizer products or bulk ingredients that were for sale in Connecticut. These products were collected by Agricultural Commodities Inspectors at The Connecticut Department of Agriculture. The products were collected at manufacturing facilities and wholesale dealers as well as from retail stores. The fertilizer products tested, the sample analysis results for N, P_2O_5 , K_2O and the guarantees for January 2024 through December 31, 2024, can be found in Table 1.

Fertilizer products are reported to be unsatisfactory (failed) for N if the upper end of the method uncertainty result range is less than the percent analytical variation guidelines as established by the Association of American Plant Food Control Officials (AAPFCO). If a N result is below the guarantee but passes this is because the upper end of the method

uncertainty result range was greater than or equal to the AAPFCO minimum analytical variation. If a sample failed it is indicated in red in Table 1. If a sample guarantee was not requested or stated as 0% it is indicated by NR (Not Requested) in Table 1. Fertilizer products are reported to be unsatisfactory (failed) for P, K, and micronutrients if the results fall outside of the percent analytical variation guidelines as established by the Association of American Plant Food Control Officials (AAPFCO).

CONCLUSION

The number of samples analyzed for NPK deemed unsatisfactory in 2024 was 4 of 39 (10.3%). Specifically, 1 sample was deficient in P₂O₅ and 3 samples were deficient in K₂O, no samples were deficient in Nitrogen. The number of samples analyzed for secondary and micronutrients deemed unsatisfactory is 4 of 22 (18%). Specifically, 1 sample was deficient in boron, 1 sample was deficient in Ca, 1 sample was deficient in both S and Fe, and 1 sample were deficient in Fe. Samples tested for secondary and micronutrients can be found in Table 2; deficient samples are indicated in red.

Table 1. Fertilizer Products Analyzed in 2024. Note: NR=Not Requested G=Guarantee and Adj G=Adjusted Guarantee according to AAPFCO analytical variation guidelines.

Sample Number	Description	Nitrogen			P2O5			K2O		
		Amount (%)	Pass/Fail	G/Adj G	Amount (%)	Pass/Fail	G/Adj G	Amount (%)	Pass/Fail	G/Adj G
Fert24 - 003	Garden Rich Root & Grow	4.1	Pass	4/3.5	9.43	Pass	10/9.31	2.96	Pass	3/2.59
Fert24 - 004	Espoma Organic Violet!	1.6	Pass	1/0.51	2.99	Pass	3/2.33	5.09	Pass	1/0.59
Fert24 - 005	Neptune's Harvest Tomato and Vegetable	2.4	Pass	2/1.5	5.43	Pass	4/3.33	1.87	Pass	2/1.59
Fert24 - 006	True Organic Liquid All Purpose Plant Food	3.9	Pass	3/2.5	2.26	Pass	2/1.33	2.47	Pass	2/1.59
Fert24 - 007	FoxFarm Liquid Plant Food Big Bloom	NR	NR	NR	2.30	Pass	0.5/0	0.88	Pass	0.70/0.29
Fert24 - 008	FoxFarm Cultivation Nation Micro	6.7	Pass	5/4.5	NR	NR	NR	1.6	Pass	1/0.59
Fert24 - 009	Miracle Grow Performance Organics Edibles	9.7	Pass	9/8.4	5.51	Pass	4/3.33	11.77	Pass	2/1.59
Fert24 - 010	Soil Moist Plus Mycorrhiza Transplant Formula	9.0	Pass	0.80/0.31	3.16	Pass	0.40/0	7.64	Pass	0.40/0
Fert24 - 011	Jack's Classic Petunia Feed	20.3	Pass	20/19.3	6.63	Pass	6/5.33	20.7	Fail	22/20.85
Fert24 - 012	Coast of Maine Lobster Meal Greening and Leafing	5.1	Pass	6/5.5	3.93	Pass	2/1.33	NR	NR	NR
Fert24 - 013	Espoma Garden-Tone Herb and Vegetable Food	4.0	Pass	3/2.5	5.07	Pass	4/3.33	4.14	Pass	4/3.59
Fert24 - 014	Espoma Tree-Tone Fruit and Shade Tree Food	5.6	Pass	6/5.5	3.69	Pass	3/2.33	2.23	Pass	2/1.59
Fert24 - 015	Coop Poop Rose and Flower Plant Food	5.1	Pass	4/3.5	5.38	Pass	6/5.33	4.99	Pass	4/3.59
Fert24 - 016	True Organics Tomato and Vegetable Food	4.2	Pass	4/3.5	4.0	Fail	5/4.33	6.8	Pass	6/5.53
Fert24 - 017	Natural Alternative All-Purpose Plant Food with Phosphorus and Mycorrhizae for Strong Roots.	6.1	Pass	5/4.5	6	Pass	5/4.33	3.7	Fail	5/4.57
Fert24 - 018	General Hydroponics MaxiGro 10-5-14	11.0	Pass	10/9.4	7.1	Pass	5/4.33	16.5	Pass	14/13.13
Fert24 - 019	Jobe's Fertilizer Spikes for Bountiful Vegetables	5.3	Pass	2/1.5	11.93	Pass	7/6.32	8.03	Pass	4/3.59
Fert24 - 020	Jobe's Evergreen Tree Spikes 11-3-4	18.0	Pass	11/10.4	6.01	Pass	3/2.33	5.75	Pass	4/3.59

Table 1. Fertilizer Products Analyzed in 2024, continued. Note: NR=Not Requested G=Guarantee and Adj G=Adjusted Guarantee according to AAPFCO analytical variation guidelines.

Sample Number	Description	Nitrogen			P2O5			K2O		
		Amount (%)	Pass/Fail	G/Adj G	Amount (%)	Pass/Fail	G/Adj G	Amount (%)	Pass/Fail	G/Adj G
Fert24 - 021	Osmocote Plus Outdoor and Indoor	16.6	Pass	15/14.4	9.1	Pass	9/8.32	11.8	Pass	12/11.21
Fert24 - 022	Hi-Yield Muriate of Potash	NR	NR	NR	NR	NR	NR	57.3	Fail	60/58.22
Fert24 - 023	Espoma Bio-Tone Starter Plant Food	4.1	Pass	4/3.5	3.73	Pass	3/2.33	3.12	Pass	3/2.59
Fert24 - 024	Better Gro Orchid Better Bloom 11-35-15	11.7	Pass	11/10.4	36.04	Pass	35/34.19	14.25	Pass	15/14.09
Fert24 - 025	Scotts All Purpose Flower and Vegetable.	13.6	Pass	10/9.4	10.80	Pass	10/9.31	10.2	Pass	10/9.3
Fert24 - 026	General Hydroponics MaxiBloom 5-15-14	6.1	Pass	5/4.5	15	Pass	15/14.3	13.2	Pass	14/13.13
Fert24 - 027	Jack's Classic Blossom Booster 10-30-20	10.9	Pass	10/9.4	34.65	Pass	30/29.25	20.29	Pass	20/18.92
Fert24 - 028	Schultz Orchid Food	20.3	Pass	20/19.3	25	Pass	20/19.28	16	Pass	15/14.09
Fert24 - 029	Miracle Gro Blooming Houseplant Food	0.58	Pass	0.5/0.01	1.09	Pass	1/0.33	0.56	Pass	0.50/0.09
Fert24 -030	Hurricane Hydroponics Storm Cell	1.2	Pass	1/0.51	1.54	Pass	1/0.33	2.02	Pass	2/1.59
Fert24 -031	Bulk-Allied Nutrients	45.7	Pass	45/44.1	NR	NR	NR	NR	NR	NR
Fert24 -032	Bulk-Compass Minerals	NR	NR	NR	NR	NR	NR	48.40	Pass	50/48.34
Fert24 -033	Bulk-The Mosaic Company	17.8	Pass	18/17.3	45	Pass	46/45	NR	NR	NR
Fert24 -034	Bulk-CF Industries	46.8	Pass	46/45.1	NR	NR	NR	NR	NR	NR
Fert24 -035	Bulk-Nutrien	45.8	Pass	44/43.1	NR	NR	NR	NR	NR	NR
Fert24 -036	Bulk-Mosaic Global Sales	NR	NR	NR	NR	NR	NR	20.50	Pass	21/19.88
Fert24 -037	Bulk-PCS Sales	12.2	Pass	11/10.4	51.4	Pass	52/50.9	NR	NR	NR
Fert24 -038	Bulk-PCS Sales	NR	NR	NR	NR	NR	NR	64	Pass	60/58.22
Fert24 -039	Bulk-PCS Sales	47.4	Pass	46/45.1	NR	NR	NR	NR	NR	NR
Fert24 -040	Bulk-V-Town Ag Supply	29.9	Pass	28/27.2	7.55	Pass	7/6.32	13.29	Pass	14/13.13
Fert24 -041	Bulk-V-Town Ag Supply	9.5	Pass	10/9.4	12.12	Pass	10/9.31	11.2	Pass	10/9.3

Table 2. Fertilizer Products Analyzed in 2024: Secondary and micronutrients. Amounts in % content.

Sample Number	Description	Ca	S	Fe	B	Co	Cu	Mg	Mn	Mo	Zn
Fert24-001	Earth Science Fast Acting Gypsum for Gardens	23.0	18								
Fert24-002	Earth Science	15.8	12.2	9							
Fert24-004	Espoma Organic Violet!	1.0									
Fert24-005	Neptune's Harvest Tomato and Veg.	1.0									
Fert24-007	FoxFarm Liquid Plant Food Big Bloom			0.33							
Fert24-008	FoxFarm Cultivation Nation Micro	5.8		0.15	Deficiency 0.008 ¹	0.00027	0.1		0.07	0.002	0.7
Fert24-009	Miracle Grow Performance Organics Edibles	5.2		0.16			0.07		0.05		0.06
Fert24-011	Jack's Classic Petunia Feed			0.21	0.02		0.05	2.2	0.05	0.01	0.05
Fert24-012	Coast of Maine Lobster Meal Greening and Leafing	14.3									
Fert24-013	Espoma Garden-Tone Herb and Vegetable Food	8.3	2.6					1.9			
Fert24-014	Espoma Tree-Tone Fruit and Shade Tree Food	7.2						0.82			

¹Boron label claim 0.02%; ²Calcium label claim 6%, ³Sulfur label claim 4.22%, ⁴Iron label claim 4.02%, ⁵Iron label claim 0.56%

Table 2. Fertilizer Products Analyzed in 2024: Secondary and micronutrients, continued. Amounts in % content.

Sample Number	Description	Ca	S	Fe	B	Co	Cu	Mg	Mn	Mo	Zn
Fert24-016	True Organics Tomato and Vegetable Food	Deficiency 3.8 ²	2.1								
Fert24-017	Natural Alternative All-Purpose Plant Food with Phosphorus and Mycorrhizae for Strong Roots	2.8	Deficiency 3.3 ³	Deficiency 1.3 ⁴							
Fert24-018	General Hydroponics MaxiGro 10-5-14	6.1	2.9	0.14			2.2	0.06	0.025		
Fert24-021	Osmocote Plus Outdoor and Indoor		6	Deficiency 0.43 ⁵	0.2		0.087	1.3	0.11	0.029	0.09
Fert24-023	Espoma Bio-Tone Starter Plant Food	8.6	1.9				1.3				
Fert24-024	Better Gro Orchid Better Bloom 11-35-15			0.13	0.034		0.04	0.77	0.12	0.00047	0.05
Fert24-025	Scotts All Purpose Flower and Vegetable		1.7								
Fert24-026	General Hydroponics MaxiBloom 5-15-14	4.9	6.5	0.14			5.1		0.022		
Fert24-027	Jack's Classic Blossom Booster 10-30-20			0.11	0.02		0.05	0.71	0.05	0.0018	0.06
Fert24-028	Schultz Orchid Food			0.37	0.02		0.06		0.05	0.00025	0.07
Fert24-030	Hurricane Hydroponics Storm Cell			0.12	0.02				0.04	0.0017	0.05

¹Boron label claim 0.02%; ²Calcium label claim 6%, ³Sulfur label claim 4.22%, ⁴Iron label claim 4.02%, ⁵Iron label claim 0.56%

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