How to Determine the Actual Product Being Applied in Your Fertilizer Program

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In determining a fertility program, there are as we know, many factors to consider.

Some of which are: How much N.P.K. will be the most beneficial in our management program? What nutrient sources do we want to use? How long do we want the nutrients to be available? What ratio of N. to P. to K. do we want? Do we need minors? The list of decisions can go on and on.

As we all know the fertility program is only a part of the overall management practices used in promoting quality turfgrass; however, fertilizer used properly can enhance desired results and aid in the overall success of our programs. Everyone has his or her own criterion used to monitor the success of a fertility program. It may be turf color, or density of growth rate, or root depth, or tolerance to stress or the ability to recover after stress. All of these are good, but the criterion used can only be made by the turfgrass managers in their particular circumstance.

It becomes apparent that with all the decisions to be made, a thorough knowledge of the plant nutrients you are applying to the turf and what you can expect by their use is most important. You must decide what nutrients you want to apply and then purchase product based on anticipated results and cost according to what your budget or bid provides. It is not uncommon to determine the cost of a fertilizer program based on the number of weeks the nutrients are available. Also the amounts of each nutrient is important. EXAMPLE: Should a nitrogen source release over a period of twelve weeks, you could base the cost factor by taking the cost per acre and divide by (12) the number of weeks fo feeding. This would determine a weekly cost per acre.

In the case of a three-week material, divide the cost per acre by (3) to determine a weekly cost. The question then has to be, is a fertilizer analysis with a ratio of 20% slow release nitrogen that feeds for 12 weeks and 80% of the nitrogen that feeds for three weeks considered a three-week or a 12 week material? The answer is that it is neither a three week or a 12 week material. A product or a portion of a product has to be judged and cost accounted for by the results delivered to the individual. The reason this is mentioned is because with the literally hundreds of fertilizer analyses available, the purchaser must have the ability to look at a product breakdown and compute the percentages of the nutrients they will receive based on the label or the literature description. Purchases have been made based on cost with the intent of purchasing a slow release type material that in reality has a very low percentage of slow release.

In this article my objective is not to compare one source of plant food to another or to compare one product line to another or to suggest one particular analysis over another. My objective is to provide some information and math formulas that can be used to breakdown a fertilizer analysis. Product information is provided by all fertilizer companies on their analysis and can be found on the bags, on the specification sheets and on the literature. With this information we can determine exactly what is being applied to the turf areas. That coupled with knowledge of what to expect from each plant food will allow individuals to take any product and equate a cost based on what they are receiving. In dealing with cost it is impossible to compare one fertilizer analysis to another based on cost per bag, cost per ton or cost per acre, without knowing the breakdown of the product you are using or are planning to use. I will illustrate by using two fertilizer analyses for examples. I suggest looking at the products you presently use to determine if you're getting what you want and what you are paying for.

All fertilizer analyses are based on percentage per ton of the plant nutrients listed in the analysis. EXAMPLE: fertilizer with a 24-4-12 analysis is 24% of 2,000 lbs. actual nitrogen. 4% of 2,000 lbs. actual phos. and 12% of 2,000 lbs. actual potash. The same holds true for all nutrients listed in a fertilizer analysis. The analysis itself does not determine the cost of the material. The costs are determined by the products that make up the anaysis. EXAMPLE: 24-4-12, the nitrogen percentage is 24%; however, the make-up of nitrogen is derived from three different sources. We are 1.6% ammoniacal 10.8% W.I.N. from IBDU and 11.6% urea W.S.N. This information is listed on the bag as well as our literature and specification sheets, as it is with all fertilizer companies. By totaling the three nitrogens that make up 24-4-12 you see they total 24%. With this information you can now mathematically compute how much of each nitrogen source you're applying to your turfgrass. The first step is to find out how much total N.P.K. and other nutrients are contained per bag. The second step is the coverage per bag and the number of bags needed per acre

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or per M to apply the amount of plant foods or total N. you desire. The math formula to determine N.P.K. plus other nutrients is to take the nutrient percentage X the weight of the bag, and divide the total by 100. Note: make sure you have the proper bag weight due to a number of different bag weights available. Step 1: 24-4-12, 24% N. x 50 lb. bag =1200 divided by 100 = 12 lbs. actual N. per bag. 4% P. x 50 = 200 divided by 100 = 2 lbs. actual P. per bag. 12% K. x 50 = 600 divided by 100 = 6 lbs. actual K. per bag. .7 MG x 50 = 35 divided by 100 = .35 MG per bag. 5% S x 50 = 250 divided by 100 = 2.5 lbs. S per bag. .4% Fe. x 50 = 20 divided by 100 = .2 lbs. Fe per bag. Step 2: Determine actual N. desired and multiply amount by 43.56 the number of 1,000 sq. ft. per acre, for instance, .5 lb. N. desired per M x 43.56 = 21.78 lbs. actual N. needed per acre.

We know that there is 12 lbs. actual N. per bag 24-4-12, so to compute the number of bags needed per acre we would take the desired N. 21.78 lbs. divided by 12 the number lbs. N. per bag and find that we need 1.815 bags 24-4-12 per acre to apply .5 lbs. N. per 1,000 sq. ft. 1.185 bags per acre x 50 lb. bag = 90.75 lbs. material divided by number sq. ft. per acre 43.56 = 2.08 lbs. material per M to apply .5 lbs. actual N. per M. The same math holds for all nutrients contained per bag. To deliver 1 lb. actual N. per M, the same math holds true. If we want 1 lb. actual N. per M, take 43.56 divided by 12 the number of lbs. actual N. per bag to see that we need 3.63 bags per acre. Bags per acre 3.63 x 50 = 181 lbs. total material divided by 43. 56 = 4.16 lbs. material per M sq. ft. to deliver 1 lb. actual N. The cost per acre is determined by the cost per bag x the number of bags being used. To this point we know how much actual N. is being applied as well as how much other nutrients are contained in each bag. A key point now is to break down the nitrogen sources and compute how much of each we are applying to the turf. A note before proceeding, any company can produce a 24-4-12 fertilizer analysis or a 32-3-8 etc. The key is to know your nutrient sources and percentages to determine if the products are equal to one another. The 24% nitrogen in 24-4-12 again is made from three nitrogen sources. We are 1.6% ammoniacal 10.8% W.I.N. from IBDU and 11.6% urea W.S.N. In order to compute the amount of each being applied to the turf, we must see how much of each is contained per bag x the number of bags being applied per acre. We will use as an example 1 lb. actual N. applied per acre. The math series is 1.6% ammoniacal x 50 weight of the bag = 80 divided by 100 = .8 lbs. ammoniacal per bag x 3.63 bags per acre for 1 lb. N. =2.904 lbs. ammonaical applied per acre when applying 1 lb. actual N. per M. 10.8% W.I.N. from IBDU x 50 = 540 divided by 100 = 5.4 lbs. W.I.N. per bag x 3.63 = 19.602 lbs. W.I.N. per acre. 11.6% urea W.S.N. x 50 = 580 divided by 100 = 5.8 lbs. W.S.N. per bag x 3.63 = 21.054 lbs. W.S.N. applied per acre. Add the totals and you have 43.56 lbs. actual N. per acre.

To determine the long term release percentage of this product we would take the amount of W.I.N. being applied 19.602 lbs. divided by 43.56 total N. being applied to find that 45% of the nitrogen applied is W.I.N. long term release. To complete the math for total nutrients being applied we see that there is 7.26 lbs. P 21.78 lbs. K. 1.27 lbs. Mg 9.07 lbs. S and .726 lbs. Fe. being applied per acre at 1 lb. N. with 24-4-12. These numbers are important when you are putting your program together with them you can accurately compare what you are receiving from one product to another

The next analysis we will look at is 32-3-8. The math series is the same as before. 32% N. x 50 = 1600 divided by 100 = 16 lbs. total N. per bag. 43.56 divided by 16 = 2.7225 bags per acre to apply 1 lb. N. 2.7225 x 50 = 136.125 lbs. material per acre divided by 43.56 = 3.125 lbs. material per M sq. ft. to deliver 1 lb. N. The nitrogen breakdown of 32-3-8 is 1.2% ammoniacal 3.6% W.I.N. from IBDU 6.1% CSRUN (Coated Slow Release Nitrogen) 21.1% urea W.S.N. Total N. sources = 32% N. To total nutrient sources being applied, we again take the total of each product per bag x the number of bags being applied per acre. Math series 1.2% ammoniacal x 50 = 60 divided by 100 = .6 x 2.7225 = 1.63 lbs. ammoniacal per acre. 3.6% W.I.N. x 50 = 180 divided by 100 = 1.8 x 2.7225 = 4.90 lbs. W.I.N. per acre 6.1 CSRUN x 50 = 305 divided by 100 = 3.05 x 2.7225 = 8.30 lbs. CSRUN per acre. 21.1% W.S.N. x 50 = 1055 divided by 100 = 10.55 x 2.7225 = 28.72 lbs. W.S.N. per acre. To determine long-term release percentage, we take the IBDU W.I.N. 4.90 lbs. per acre plus the CSRUN 8.30 = 13.20 lbs. slow release being applied per acre. 13.20 divided by 43.56 = 30% of the nitrogen being applied is slow release. To complete the nutrients being applied, we find there is 4.08 lbs. P 10.89 lbs. K. and 9.52 lbs. S per acre at 1 lb. actual N. The importance in looking at these two products is that 24-4-12 is a higher cost than 32-3-8 when pricing the products on a per acre basis, but to further compare the two we find that the slow release portion of 24-4-12 is all IBDU W.I.N. and the 32-3-8 combines IBDU and CSRUN to arrive at the slow release portion of the product. Also, to look at the pounds of slow release being applied in the analysis at 1 lb. N., we find that 24-4-12 applies 19.60 lbs. W.I.N. slow release and 32-3-8 applies 13.20 lbs. slow release N. per acre. To mathematically compute the percentage difference we take the difference and divide by the lower number. 19.60 less 13.20 = 6.4 lbs. difference (24-4-12 applies 6.4 lbs. more actual slow release per acre than 32-3-8) 6.4 divided by 13.20 = 48% more slow release with 24-4-12. To look at the potash 10.89 lbs. with 32-2-8 and 21.78 with 24-4-12 21.78 less 10.89 = 10.90 lbs. more potash with 24-4-12 which is 100% more potash being applied.

In conclusion, study fertilizer math. Compare what you are receiving in different products.