

Dale Kern, author of this comprehensive review of seed testing programs is president of Seed Technology, Inc., an independent laboratory located at Marysville, Ohio. In operation since 1954, the lab does testing from coast to coast in addition to contracts with the governments of Formosa, Germany, and France. Many major seed companies in this country are clients of Seed Tech. WTT is happy to present this forthright analysis by Mr. Kern for benefit of the turf professional.



Seed Technology, Inc. Develops

# Turf Analysis Test

By DALE KERN

**T**ODAY there is good news for you who are professional turf men. No longer are you forced to live with the law of averages when you plant seeds! This law of averages indicates that 20 percent of the professional turf men who seed grass on golf courses will be sowing *Poa annua* up and down fairways next spring. That's one of every five.

Again, the law of averages says 8 percent will be planting bentgrass in fairways. Six percent will be dropping timothy seed from tee to green on No. 7 or maybe the other seventeen. Four percent will be planting sorrel—and 5 percent will infest fairways with chickweed, come planting time in May.

These percentages are dictated by the law of averages. But, this law, like every law, has a loophole.

"Beating the law of averages" wasn't conceived by my profession. The United States Department of Agriculture thought of the idea many years ago. In fact, this department established the standards that the seed industry must meet in order to sell seed.

Standards established by the USDA were designed to protect the farmer from unscrupulous seed merchants. As you know, every lot of seed offered for sale must carry a tag or label.

The seed grower and seed merchant must be sure his seeds are properly labeled before they are offered for sale. So, the grower or merchant submits samples of seeds to laboratories for testing. These laboratories meet the specifications established by law, and provide the seed merchant with a certificate of analysis. Now the merchant can legally label and sell his seed.

This is a good arrangement; except — government regulations and standard laboratory tests **DO NOT GIVE YOU, THE PROFESSIONAL TURFMEN, WHAT YOU NEED.**

Why?

Standard laboratory tests that meet government specifications fail to tell the full story. A standard analysis tag means different things to different people. To the merchant, it means he can legally sell his wares. To the lab technician, it means all his procedures have complied with Feder-

al Seed Act Regulations. To the buyer who will plant the seed, this tag could mean almost everything . . . or practically nothing.

It all depends on how much the buyer wants to know, and how much he is willing to guess.

## More Info Needed

If you want beautiful fairways, with a very minimum of weed problems, then you need all the information possible. You have to know! If, on the other hand, you are satisfied with average results, you can afford to guess.

When you study the analysis tag, how much will you know, and how much will you be required to guess?

Suppose we analyze the tag. It tells, by percentage of weight, (that term is mighty important) the pure seed, crop, inert, and weeds in a sample of seed. It also tells the percentage of seeds that germinated, and date of germination test.

Now, the breakdown.

Item by item; here's what you'll know, and here's what you'll have to guess.

For example, consider a tag taken from a lot of high quality,

blue tag, certified Merion bluegrass seed.

Pure seed	97.85%
Crop	.10%
Inert	2.00%
Weeds	.05%

Again, remember, all of the figures are percentage by weight.

Let's go back to the top line.

Pure seed—97.85%. What does this mean to you as a seed buyer? Simply this: 97.85 pounds in every 100 pound bag is pure Merion bluegrass. The other 2.15 pounds are made up of inert, crop and weeds.

If you know the percentage of pure seed, and the total number of pounds in the lot, it's a matter of multiplying the percentage by the total weight to know the pounds of pure Merion bluegrass you are getting for your dollars. There isn't much to guess about in the "Pure Seed" category.

Back to the tag—this time look at Crop percentage. Here we find the percentage figure .10%.

Now, what do you know?

Well, you know that by weight there is about one-tenth of one percent Crop Seed in the lot. You also know Crop is any seed grown for economic purpose.

Anything left to guess about? You better believe there is! First of all, what kind of crop makes up this one-tenth of one percent by weight?

If you guess Delta, Park, Newport bluegrass, or seeds of Red, Chewings or Illahee fescue, no problem. The plants produced by these seeds will probably never be noticed by the average golfer.

But, if you guess wrong—if the crop seeds are timothy, redtop, tall fescue, ryegrass, Orchard grass or bentgrass—you're in trouble. Most of these are pasture grasses. Their plants are broad-leaved, off-color, fast growing clump or bunch grasses, and appear unsightly to everyone.

#### How Many Seeds

Here is something else in the Crop category you can guess—HOW MANY SEEDS are repre-

## TURF ANALYSIS

A Special Test designed for Golf, Industrial, and Sod Superintendents

Lab No. <u>17759</u>	%	PURITY	GERMINATION
Labeled as <u>MERION KENTUCKY BLUEGRASS</u>		Pure seed	% normal
Lot No. <u>1-3142</u>	98.43	<u>MERION KENTUCKY BLUEGRASS</u>	89
Date <u>JUNE 21, 1968</u>			completion date
FOR <u>SEED CO.</u>			<u>JULY 23, 1968</u>
	.16	crop	Remarks:
	1.41	inert	
	.00	weeds	Tetrazolium %

25 GRAM SAMPLE HAS BEEN CHECKED FOR THE FOLLOWING CONTAMINANTS

Per lb CROPS	Per lb WEEDS	Per lb WEEDS	Per lb WEEDS
<u>91</u> Bentgrass	Barley, foxtail	Heal-all	Velvetgrass
Bromegrass	Barley, wild	Henbit	Wild onion
Clover, alsike	Black medick	Knotweed	<u>217</u> Windgrass
Clover, hop	Camomile	Mayweed	Yarrow
Clover, white	Cats-ear	<u>18</u> Mustard	Yellow rocket
Fescue, meadow	Chess	Pennycress	OTHERS
Fescue, tall	Cinquefoil	<u>36</u> Peppergrass	<u>109</u> PIGWEED
Orchardgrass	Cress	Plantain	<u>199</u> CURLY BLOOM
Poa Trivialis	Dandelion	Puccinellia	<u>18</u> FALSE FLAX
Redtop	Dock	Sedges	<u>109</u> CHICKWEED
<u>72</u> Ryegrass	Erysimum	Shepherds purse	
<u>18</u> Timothy	Fescue, raitail	Silver hairgrass	
Wheatgrass	Fleabane, daisy	Sisymbrium	
<u>0.16%</u> KENTUCKY BLUEGRASS	Foxtail, water	Sorrel	
	Goosegrass	Speedwell	

Poa annua 91 per pound based on a 10 gram examination



### seed technology inc.

SPECIALIZING IN THE ANALYSIS OF TURF GRASSES  
R.F.D. 5

Marysville, Ohio



DALE KERN

Seal No. 016

Registered Technologist

**Example I.** Turf analysis test lists eight kinds of weeds for a total of 888 weed seeds per pound, including 91 *Poa annua*. Also, report shows 181 crop seeds per pound.

Lab No. <u>17759</u>	% PURITY based on <u>1</u> gm.	GERMINATION	
Labeled as <u>MERION KENTUCKY BLUEGRASS</u>		PRELIM.	FINAL
Lot No. <u>1-3142</u>	98.43	in ___ days	% Hard % Normal
Date <u>JUNE 21, 1968</u>	<u>MERION KENTUCKY BLUEGRASS</u>		89
FOR <u>SEED CO.</u>		No. of seeds used. Germ <u>400</u> TZ	
	.16	Completion date <u>7-23-68</u> in <u>28</u> days	
	1.41	Charge	
	.00		
Carbon copy	OTHER WEEDS based on <u>1</u> gm. rate/oz.	CROP based on <u>1</u> gm. rate/oz.	
NOXIOUS WEEDS for <u>ALL STATES</u>	NONE FOUND	KENTUCKY BLUEGRASS <u>0.16%</u>	
based on <u>25</u> gm. rate/oz.			
NONE FOUND			
RATE OF POA ANNUA BASED ON <u>1</u> GR			
REMARKS			



CERTIFICATE OF ANALYSIS

### seed technology inc.

SPECIALIZING IN THE ANALYSIS OF TURF GRASSES

R.F.D. 5

Marysville, Ohio

ALL PROCEDURES COMPLY WITH FEDERAL SEED ACT REGULATIONS



DALE KERN

Registered Technologist

Seal No. 016

**Example II.** Standard test following regular procedures for testing and reporting shows no weeds, and .16 percent crop seeds which in this instance are Kentucky bluegrass.

sented in this .10%.

As you know, all crop seeds are not the same size. Some are large, some are quite small. They come in assorted sizes. The .10% represents only about 1½ ounces in a hundred pound bag.

Suppose you are going to seed a new fairway that is about 400 yards long and 50 yards wide.

If .10% by weight of tall fescue (the seeds being quite large and heavy) this would be equivalent to 54,400 plants of this type

up and down your fairway.

If this were .10% Orchard grass, it would give you 364 seeds per pound, or 72,000 seeds in your fairway of this type of plant.

Another old pasture grass often found in Merion is timothy. That .10% would produce 254,000 plants of this nature up and down your fairway.

The smallest crop seed we see is bentgrass. Seed is so small that .10% by weight equals 948,000 seeds in the 200 lbs. of Merion bluegrass required to seed that 400 x 50 yard fairway. Yes, that is right, 948,000 seeds providing bent patches all up and down your fairway.

In each case, the .10 percent of the crop seeds just mentioned would be a serious problem.

### Inert Materials

Now we come to inert—the percentage by weight of anything that is not classified as a seed. This could be corn cob, ground up hay, sand, or chaff—we've seen them all.

Here we see the figure 2.00%. The only type of inert likely to be present in the seed you are buying is chaff, which are empty hulls.

Now, let's consider the last item on our now familiar tag. Here we see weeds, .05%.

Simple arithmetic—and you will know the number of ounces or pounds of weeds in a lot of seed.

From this point on the prognosticator can really have a field day. And, I know of no place where guessing wrong carries a greater penalty.

You can guess:

1. What kind of weeds are in the lot?
2. Are the weed seeds large or small?
3. How many seeds does this .05% represent in a 100-pound bag?
4. Are they problem weeds?
5. Will the weeds survive low, frequent mowing and a freezing winter?

6. Will the weeds spread out in all directions by underground stems called rhizomes?

7. Will the texture and color stand out and be unsightly?

If we take that .05% weeds and start seeding our 400 x 50-yard fairway, here's what could happen.

This .05% by weight of knotweed, when expanded to the fairway, would give you 75,000 of these plants to distract from the uniformity of your bluegrass. Suppose it's only .05% of chickweed. These seeds are extremely small and you could place 4 to 5 of them on the head of a pin. Their smallness would account for 560,000 of these plants up and down your fairway. Let's take a look at an old familiar one to all. If the .05% weed happened to be all *Poa annua* seeds that would calculate out to 151,200 annual bluegrass plants to combat. We regularly see these weeds present in that amount. It is obvious that out in the fairway not every one of these problem seeds survive. Many do not germinate, others start to grow and are not strong enough to survive. Still others will lay in the soil for some years before they come forth to plague you. However in these great numbers, enough of them will make it to create real problems.

### One Gram Tests

Now, let's consider one gram of seed. It fills a teaspoon about  $\frac{2}{3}$  full! This is the amount of seed the U.S. Department of Agriculture recommends to be used in making a purity analysis. Every laboratory in the country uses 1 gram of seed (Merion bluegrass included) to determine the percentage of pure seed, crop, inert and weeds.

This one gram is sub-divided from a large amount of seed, and could represent 5 pounds or 5,000 pounds. In spite of the very small amount of seed used, the test is fairly accurate.

When I say this one gram test is fairly accurate, I do not wish to infer that it is always adequate. This is pretty much the crux of our discussion—what is adequate for the farmer, the home gardener, or the housewife is by no stretch of imagination adequate for you as a professional turfman.

Let me explain!

Suppose we take the two items you are most interested in when you buy a lot of seed; namely, weed and crop. As I said before, every laboratory in the country uses 1 gram (or about  $\frac{2}{3}$  teaspoon of seed) in making the test. Now, if no weeds or no crop are found in this very small amount, naturally the tag would read "NONE" under the weed column, and .00% under the crop column. You, as the buyer, would assume when you read the tag that the entire crop was free of weeds and crop.

Unfortunately, in most instances this **JUST ISN'T TRUE!**

If the seed laboratory were to take 10 or 25 times the original one gram and examine this amount of seed, the analyst would come up with quite a different story.

State and Federal agencies recognize the inadequacy of the one gram test. To protect the buyer, these agencies specify that 25 grams be examined for certain weed seeds.

### Which Weed Seeds

The Certification agencies say the seed laboratory must look for certain weeds and list them as they examine the 25 grams. There are two that might be a problem to you; quackgrass and wild garlic. You can forget about the rest; you'll never have a serious problem with them. Keep in mind that this list was designed to cover all kinds of certified seed, not just Merion bluegrass.

What happens when the seed analyst detects other weed seeds that you and he know could be

very bad in your fairway? Now remember, the government and certification instructions say to list **ONLY THE WEED SEEDS SPECIFIED**. Well, the analyst ignores the other weeds—that's what he is instructed to do.

How many crop seeds will the analyst list as he examines this 25 grams? The answer is **NONE**.

The 25 gram examination is for certain weeds only, and that is precisely how the test is conducted. Weed seeds not on the list, and all crop seeds are ignored in the 25-gram test.

We at Seed Technology, Inc., have recognized for a long time that standard tests and simple compliance with government and certification regulations is inadequate. Professional turfmen need more information than this from a Seed Laboratory.

#### **Turf Analysis Test**

From this philosophy and to give precise information, we developed the **TURF ANALYSIS TEST**. This Turf Analysis test is designed especially for the professional turfman in the golf and sod areas. It is not structured to meet government (either state or federal) specifications, neither is it designed for the farmer or any certification group.

The upper one-third of the Turf Analysis test report sheet is the standard purity test, meeting government requirements. The information given in this section is no better (or no worse) than the information you get on every tag. The **BOTTOM TWO THIRDS** lists 49 of the most troublesome crop and weed seeds to the professional turfman, for whom the analysis test was designed.

But, even more significant than the crop and weed seeds listed, is the fact that we *examine 25 grams of seed when making this analysis*, in order to improve the chances of finding crop and weed seeds.

For a comparison of a standard test and a Turf Analysis test, made of the same lot of seed,

see Example I and Example II.

The standard report shows a purity of 98.43; Crop .16; Inert 1.41 and .00 weeds, based on 1 gram sample. True, we did not find any weeds in the 1 gram purity test, so none is listed. On the standard test we then examined the large 25 grams of seed for the noxious or prohibitive weeds on the Certification list and again we did not find any so "none found" is typed on the report. The standard test requires the examination of 1 gram for "other weeds and crop." This we did and reported "none found" under other weeds and .16% Kentucky bluegrass under crop. This from the surface looks like very acceptable lot of seed. Certainly no one would hesitate to seed it.

Now let's take a look at the same seed when subjected to the Turf Analysis test. The 1 gram purity remains the same. The percentage of pure seed, crop and weeds does not change.

However, when we examine the large amount for everything present, the true picture comes to light. When we examined the 25 gram for crop we found 91 bentgrass, 72 ryegrass, 18 timothy for a total of 181 per pound of obnoxious crop seed. When we examine the 25 grams for all weeds and not just the few in the states or certification list, note what happened. Instead of reporting "none found," we list 7 different kinds of weeds for a total of 797 weed seeds per pound. Included in the 797 weeds per pound are such things as 109 seeds of chickweed, and the presence of *Poa annua* at the rate of 91 per pound.

#### **Poa Seldom Wanted**

*Poa annua* is not considered prohibitive for certification and is considered noxious in only a few state seed laws. But we know what a bug-a-boo it is to most turf professionals.

*Poa annua* is a member of the bluegrass genera, and to the naked eye or under low magnifi-

cation, it is literally impossible to distinguish it from other bluegrass. Put this same seed under a microscope and the difference is easy to spot.

Here's the problem: The total viewing area under the microscope is about the size of the head of a thumb tack. Now, how do you glue 48,000 seeds to the head of tacks, and then place all of these tacks, one by one, under the scope?

Obviously, this is impossible. At Seed Tech, we search for *Poa annua* under a microscope. We have combined special vibrators with a microscope, and march the seeds in a single layer under the scope. This enables our analyst to look at more seeds under higher magnification in much, much less time.

A special microscope check is made on approximately 40,000 seeds to tell you how much *Poa annua* is present in every pound of seed. And, we know we're right!

Another interesting operation made in every Turf Analysis test at our lab is the bentgrass check. Bentgrass is an extremely small seed, and has the tendency to lodge or stick to larger seeds and ride over the screens during the cleaning operation.

The bentgrass seed is still riding "piggyback" on the larger seed when it comes into the laboratory. This means the larger seed could, and in many instances does, hide the bentgrass from the analyst's view. You just can't turn over 120,000 seeds to see what's hiding underneath.

We solved this problem at Seed Tech by developing a special piece of equipment that literally shakes the bentgrass seed out of the larger seed. Since the bentgrass seed is smaller, it passes through special screens and is easily collected, and examined under a microscope. We are the only laboratory in the country making this kind of a check.

In the Turf Analysis test, you get the name (and number per



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pound) of every weed seed and every crop seed found in a 25 gram sample! This includes a special 10 gram *Poa annua* and bentgrass check.

**New for the Industry**

If you went to your family doctor for an examination along about the time the government set up the first standards for the seed industry, here is about what the good ol' doc would have done: Looked down your throat, checked your pulse and listened to your heartbeat through his stethoscope. And, that's about it.

Since that time the medical profession has developed techniques, instruments and equipment that staggers the imagination. But, the seed industry has not made similar strides which are necessary.

What will tomorrow bring? What are we experimenting with today that will make your profession more efficient and more useful tomorrow? We can list three projects. One is available now. The other two could make exciting news—maybe next year, maybe five years from today.

In the future we see first the use of chemicals to learn if a seed is dead or alive, weak or strong. Second, the use of electronic eyes to count the seeds that germinate and measure the rate of growth. Third, micro photography will enable us to make a fingerprint of a plant or single leaf and identify it's variety or trueness to type.

The chemical triphenyl tetrazolium chloride is now being used by Seed Tech to quickly determine the germination potential of a lot of seed. At Seed Tech in 24 hours and for the cost of a carton of cigarettes you can get the known germination. This is our Tetrazolium test. The live embryo shows red, the dead seed remains white. At the present time about all we can give you in germination is the total percentage that will grow. Two lots of seed each germinating 90% can

be quite different. One could be a vigorous fast growing lot and at 10 days 80 plants out of a 100 would have grown to an inch height with an inch long root. In the same 10 days, the other lot might have only 30 plants of equal height and root length. With the use of electric eyes and counters we will soon be giving a germination percentage plus an A, B, or C rating depending on how many and how fast the seeds grow. This could mean cutting the critical time required to establish turf by days through choosing a fast growing lot.

The trend is for more and new varieties of grasses to become available to you. As this continues it will become increasingly important to make certain that the variety is not some old one with a new name and secondly that when you pay a premium price that you get what you're paying for. There is good promise that by making a fingerprint of the leaf surface and then photographing it through a microscope, it will some day be possible to identify a single plant or possibly a single leaf, making certain that you are getting that highly desirable grass that you want. This service will no doubt be forthcoming in the future.

The Turf Analysis test is a break-through in giving information, and more insight into what to expect when you buy a lot of seed. But, no one recognizes more than we at Seed Tech that we must offer more comprehensive tests and analysis in the months and the years, to come.

Coming in the  
February 1969  
WEEDS TREES AND TURF  
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