

# PURE LIVE SEED: CALCULATIONS AND CONSIDERATIONS FOR WILDLIFE FOOD PLOTS

Have you heard the adage, "proper planning prevents poor performance?" This adage applies perfectly to establishing food plots for wildlife, but you just have to adjust the words: "Proper *planting* prevents poor *food plot* performance".

When we talk about planting, we include planting method, timing, depth, and planter calibration, but we also include **seeding rate**. While there are many steps prior to planting to ensure a successful food plot—including taking a soil test, adjusting the soil fertility, and proper site preparation—determining the proper seeding rate based on *pure live seed* rather than bulk weight may be one aspect that people skip or ignore.

All agronomic seeds have a recommended seeding rate. This is the rate that maximizes forage or grain production and minimizes seed costs. Planting food plot seed too heavily is often a waste of money, because it increases your seed cost, but does not necessarily increase your forage or grain production. Planting food plots too lightly is an inefficient use of field space, opening areas up for weeds to overtake your planting, and could result in failure because of over-browsing.

Seeding rate also varies by planting method and it's important to make sure to follow the recommended seeding rate for the planting method you will be using. This rate is greater when broadcasting rather than when drilling or planting seed (broadcast rate: 75-100 lbs/ac vs. drilling rate: 50 lbs/ac for iron-clay cowpeas).

It is important to recognize the difference in how seed is sold (bulk weight) and how seeding rates are recommended (pure live seed [PLS]). When you buy seed from a supplier you are buying it in the form of bulk weight. Bulk weight is the total weight inside the bag, including the food plot



seed, as well as the weight of the seed coating and other material (other crop seed and weed seed).

While seed is sold by bulk weight, seeding recommendations are commonly given as PLS rates. This distinction is important. For example, all the recommendations in *A Guide to Wildlife Food Plots and Early Successional Plants* by Dr. Craig Harper (University of Tennessee Extension) are given in PLS rates. Pure live seed is the living seed of the intended crop that will germinate from a seed bag and accounts for the weight of the bag made up of impurities, weed seed, and other crop seed.

Percent PLS in a seed bag varies, depending on the amount of pure seed in the bag as well as the germination rate of that seed. It is important to know the difference between PLS and bulk weight so that you can calculate the amount of bulk weight you need to achieve the recommended PLS seeding rate.

Keep the distinction between bulk weight and PLS weight in mind when buying seed to ensure you purchase enough seed to cover the entire area of your food plot. In this article we will explain how to calculate PLS based on information given to you when you purchase seed.



# PURE LIVE SEED: CALCULATIONS AND CONSIDERATIONS

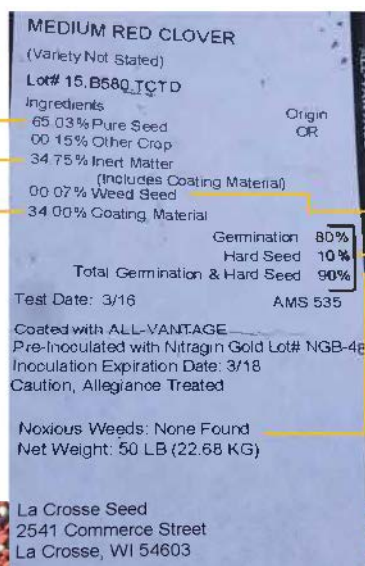
## Dissecting a seed tag - know what you're getting before you purchase.

Before we get too far into calculating PLS, it is important to understand what information you get when purchasing seed. Regardless of whether you buy a seed mix or a single species from a co-op, feed store, or sporting goods store, all agricultural seed sold in Indiana must come with a label – commonly called a seed tag. By law, that seed tag must contain these 12 items: 1) commonly accepted name (species) and variety, 2) lot number, 3) origin of seed, 4) company who labeled the seed, 5) percentage of pure seed (>5% of weight), 6) percentage of other crop seeds, 7) percentage of inert matter, 8) percentage of weed seed, 9) species and amount of any noxious weeds (if present), 10) germination rate, 11) hard seed, and 12) calendar month and year the bag was tested.

Important items to look for when purchasing seed are explained below.

Pure seed represents the percentage (by weight) of the bag that is the labeled species. In this case, 65% of the weight of the bag is red clover seed.

Inert matter represents the percentage (by weight) of the bag that is not seed. This could represent any seed coating material (inoculant, insecticide, fungicide), stems, leaves, or other non-seed material. In this case, most of the inert matter is made up of inoculant. As indicated by the coating material label.



Other crop represents the percentage (by weight) of the bag that is other crop species besides the labeled species. In this case, 0.15% of the weight of the bag is other crop species (e.g., white clover, annual clover, etc.).

Weed seed represents the percentage (by weight) of the bag that is weed seed. In this case, 0.07% of the weight of the bag is weed seed. It's important to note that this represents non-noxious weeds. If there are any noxious weeds in the bag, they will be labeled by species.

Germination represents the percentage of pure seed that will germinate when planted. Hard seed represents the percentage of pure seed that will germinate only AFTER a frost. Total germination represents the germination rate plus the hard seed. We are interested in the germination, NOT total germination.

As we can see from this red clover seed tag, only 65% (32.5 lbs) of the 50 lb bag is actually red clover (Pure Seed). Most of the other weight is the inoculant (Coating Material; 34% or 17 lbs). Of the 32.5 lbs of red clover seed, 80% will germinate after planting (Germination). So, if you planted 15 lbs (bulk weight) from this bag (recommended PLS rate) you would actually be planting 9.75 lbs of pure seed, of which only 7.8 lbs would germinate -- meaning that you would be planting a little over half the recommended rate. See why PLS is so important now?

## Clover seed: bag half empty or half full?

It may seem odd to buy a 10 lb clover seed bag only to expect 5 lbs to actually grow, but in the case of legumes – like clovers – the 5 lbs in the bag that isn't seed may actually save you money in the long run. Having as little as 50% PLS in a bag of clover is not uncommon, as much of the weight is made up of the seed coating, which is typically an inoculant. The inoculant on clover, soybeans, alfalfa, or other legumes is living bacteria that help fix nitrogen from the air and make it usable to plants.

Planting inoculated seed – whether you inoculate it yourself or purchase pre-inoculated seed – reduces the amount of nitrogen fertilizer needed, ultimately saving you money on fertilizer application. The benefit of buying pre-inoculated seed is that it saves you the hassle of inoculating the seed yourself.

## Calculating pure live seed (PLS)

Now that you know the importance of reading the seed tag before purchasing seed, you can now think about calculating PLS. All the information you need is right there on the tag. Using the example seed tag below locate the two items labeled "PURE SEED" and "GERMINATION".

IRON CLAY COW PEAS		LOT 226-15	
98.00%	PURE SEED	GERMINATION	85%
01.50%	INERT MATTER	TESTED	JAN, 2017
00.40%	OTHER CROP	ORIGIN	CAN
00.10%	WEED SEED	NET WT.	50 LBS
NOXIOUS WEED: NONE			

Our example is 98% pure seed, meaning in a 10 lb bag there are 9.8 pounds of pure iron-clay cowpea seed. The next number we will need is the germination rate; this will also be indicated as a percentage. Our example has an 85% germination rate.

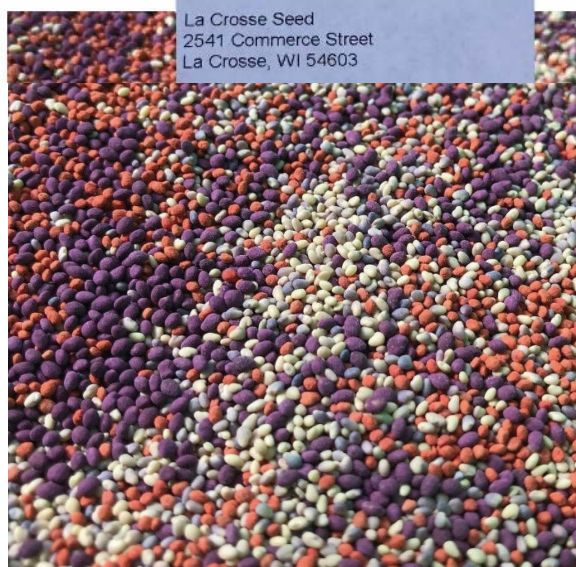
To calculate percent PLS for this seed, multiply pure seed and germination and then multiply by 100 (example below). The result is the percentage of pure live seed for this bag of seed.

98% pure seed  
85% germination  
 $(0.98 \times 0.85) \times 100 = 83\%$  (Percent PLS)

We now know that 83% of our bag is iron-clay cowpeas capable of germinating. Now that we have the PLS of our seed we can calculate the amount (lbs) of pure live seed in our bag. To do this, multiply the bulk seed weight by the percent PLS.

50 lb bag  $\times$  0.83 (Percent PLS) = 42 lbs PLS

For example, a 50 lb bag would equal 42 lbs of iron-clay cowpea seed that will germinate.



Most pre-inoculated clover seed will have a colored seed coating (purple and orange seed), which helps distinguish it from uninoculated seed (tan seed in this mix).

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## Determining bulk seed rate

Using the percent PLS information we can also find the amount of bulk seed necessary to plant at a recommended seeding rate. To do this, take the recommended seeding rate for your planting method and divide it by the percent PLS of the seed you are using (example below). The result is the bulk weight that you will need to plant per acre to achieve the recommended seeding rate.

50 lbs/acre = recommended seeding rate for iron-clay cowpeas when drilling

0.83 = percent PLS of seed being planted (from example above)

$50 / 0.83 = 60$  lbs/acre

In order to plant a cowpea food plot at the recommended rate of 50 lbs/acre, we will need to plant 60 lbs/acre from this particular seed bag.

## Another benefit of calculating pure live seed? Comparing seed prices.

Not all seeds are of the same quality. Some have lower pure seed and germination rates than others. For this reason, it is not always most cost effective to buy the cheapest bag of seed on the shelf. If you wish to compare pure live seed prices between seed bags, first divide the price of the bag by the weight of the bag. This will give you the price per pound of bulk seed (example below). Now divide this price per pound by the percent PLS of the seed. The result is the price per pound of PLS.

### Seed Manufacturer X 10lbs

Pure seed 97%

Germination 92%

Price \$33

PLS  $(0.97 \times 0.92) \times 100 = 89\%$

\$/lb (bulk)  $33 / 10 = \$3.30 / \text{lb}$

**\$/lb (PLS)  $3.3 / 0.89 = \$3.70 / \text{lb}$**

### Seed Manufacturer Y 10lbs

Pure seed 91%

Germination 82%

Price \$30

PLS  $(0.91 \times 0.82) \times 100 = 74\%$

\$/lb (bulk)  $30 / 10 = \$3 / \text{lb}$

**\$/lb (PLS)  $3.0 / 0.74 = \$4.05 / \text{lb}$**

According to these calculations, seed manufacturer X is actually a better value than Y. Using this process, especially when purchasing seed in bulk, you can be a practical money saver.



## Let's plant!

Now that you know what all those numbers on the seed tag of your favorite food plot seed mean and you know how to calculate PLS, you will be able to plant your food plots at the most effective rate possible. Remember, regardless of whether you are planting acres of soybeans with a no-till drill or frost seeding a ½-acre clover patch, knowing how to calculate PLS will allow you to be more successful and save money when planting food plots.

## Resources for further information:

Seed Fillers and Carriers for Planting Native Warm-Season Grasses and Forbs, detailed resource from Purdue Extension-FNR's Got Nature? blog

Renovating Native Warm-Season Grass Stands for Wildlife: A Land Manager's Guide, free guide at Purdue Extension's Education Store

Calibrating a No-Till Drill for Conservation Plantings and Wildlife Food Plots, video

Frost Seeding to Establish Wildlife Food Plots & Native Grass and Forb Plantings, video

Habitat Help Q&A - Native Grasses and Forbs for Wildlife, video



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