TECHNICAL NOTE

USDA-Natural Resources Conservation Service
Pacific Islands Area

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Understanding Pure Live Seed (PLS)

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Introduction

A successful conservation planting begins with selecting suitable species to address resource concerns and depends highly on planting the right amount of seed of those species. The Pacific Islands Area Vegetative Specification Tool lists plants recommended for various conservation practices and it also provides recommended planting rates for those plants. Most of the planting rates are listed as lbs/acre of pure-live-seed (PLS). Pure-live-seed is seed that is viable and able to germinate into healthy seedlings. Seed purchased from commercial vendors is considered BULK-seed. BULK-seed will contain mostly pure-live-seed, but it will also contain broken seed, weed seed, and other inert material (i.e. twigs, seed chaff, etc.) that will not germinate. Understanding the difference between PLS and BULK-seed is vital to the success of any conservation planting.

Recommended Planting Rate

Planting rates vary widely from one recommendation source to another and are based on localized information and research. Environmental conditions, soil conditions, planting date, planting methods, and plant variety will all have an impact on planting success. It is very important that the planting rate selected is appropriate for the location and method of the planting. The recommended planting rate is the amount of PLS needed to achieve an adequate stand of a desired plant to address a resource concern. Expressed as lbs/acre PLS, recommended planting rates are based on planting a target "number of viable seed per square foot" to achieve a specific plant density. Plant density has a direct effect on the overall health and success of a planting. High plant densities can be effective when a quick cover is desirable, such as in critical area plantings. On the other hand, excessively high plant densities can cause developing plants to compete for available sunlight, nutrients, and water causing some plants to die. Low plant densities may lower seed costs but increase the opportunity for weed competition. Furthermore, it goes without saying that high planting rates cost more than low planting rates.

Seed Labels

A bag of seed purchased from most vendors will have a seed label to help consumers understand its contents. Of all the information provided on a seed label, %PLS is usually **not** listed, but can be easily calculated using the information that is normally provided. Bags of seed from the vendor are referred to as BULK-seed. BULK-seed will contain the desired seed, but may also include

broken seed, weed seed, and other inert material (i.e. twigs, seed chaff, etc.) that will not germinate. The percentage of desirable seed within this mixture of BULK-seed is referred to as the "purity". It is not uncommon to have 100% purity, but a bag of BULK-seed will often contain a small percentage of "other stuff" as well. The seed label will also specify the germination rate of the desired seed, also expressed as a percentage. The germination rate indicates the percentage of desired seed that will readily germinate. Percent purity and percent germination can vary greatly depending on the seed and its source.

Calculating %PLS

To assure an adequate amount of BULK-seed is acquired for a conservation planting, a farmer must convert the recommended PLS planting rate to a BULK-seed planting rate. This is easily done and begins with calculating the %PLS of the BULK-seed. The %PLS is calculated based on the %PURITY and %GERMINATION of the BULK-seed. The following formula is used to calculate Bulk-seed %PLS.

FORMULA:
BULK-seed %PURITY x BULK-seed %GERMINATION ÷ 100 = BULK-seed %PLS

EXAMPLE A: hypothetical seed label

%PURITY = **85%**
%GERMINATION = **75%**

$$\frac{85}{\textbf{\%PURITY}} \times \frac{75}{\textbf{\%GERMINATION}} \div 100 = \textbf{63.75 \%PLS}$$

Calculating BULK Seed Planting Rates

As stated previously, bags of seed purchased from a vendor is considered BULK-seed. A BULK-seed planting rate must be determined since seed are planted on a BULK-seed basis. NRCS provides recommended PLS planting rates. Farmers need to understand the importance of converting PLS planting rates to BULK-seed planting rates because oftentimes the recommended PLS planting rate is mistakenly used for BULK-seed. This can result in a substantially lower plant density, even worse, a failed planting. Loss of time and resources can be avoided by taking simple steps to convert the recommended PLS planting rate to a BULK-seed planting rate to ensure a successful planting. The following formula is used to convert the recommended PLS planting rate to a BULK-seed planting rate:

FORMULA:

lbs/Acre PLS (Recommended Rate) ÷ **%PLS** BULK-seed **x 100 = lbs/Acre Bulk-seed**

EXAMPLE B:

Recommended Planting Rate = **10** lbs/Acre PLS
%PLS = **63.75%** (from Example A)

$$\frac{10}{\text{lbs/A PLS (Recommended Rate)}} \div \frac{63.75}{\text{\%PLS (BULK-seed)}} \times 100 = \underline{\textbf{15.69 lbs/A BULK-seed}}$$

As shown in Example B, the Bulk-seed planting rate can be significantly higher than the recommended PLS planting rate. Once the BULK-seed planting rate is calculated the total amount of BULK-seed needed for a conservation planting is easily determined by multiplying the planting rate by the field area. Contact the Hoolehua Plant Materials Center for help and/or more information regarding calculating %PLS and converting recommended PLS seeding rates into BULK-seed seeding rates.

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REFERENCES

Englert, J.M., 2007, *A Simplified Guide to Understanding Seed Labels*, Maryland Plant Materials Technical Note No. 2, USDA-NRCS National Plant Materials Center, Beltsville, MD.

Hoag, J.C., L. St. John, and D.G. Ogle, 2002, *Reading Seed Packaging Labels and Calculating Seed Mixtures*, *Plant Materials Technical Note 4*, USDA-NRCS, Boise, ID.

Houck, M., July 2009, *Understanding Seeding Rates, Recommended Planting Rates, and Pure Live Seed (PLS), Plant Materials Technical Note No. 11*, USDA NRCS, Alexandria, Louisiana.

Leif, J., Sept 2006, Agronomy *Technical Note #13, Plant Materials- Using Seed Package Label Information to Calculate Pure Live Seed (PLS) and Seeding Rates*, USDA NRCS Rose Lake Plant Materials Program, Michigan.