

Should You Opt for the Legume? Adding Cowpeas to Forage Sorghum

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Cowpeas are a viney summer annual legume that can climb, tolerate some shade, and fill in the spaces in a summer annual grass, so should you consider adding them to a stand of forage sorghum? The answer (as usual) contains many variables, with both pros and cons to weigh. Space is at stake and plants naturally expand to fill up the available space, but just as important is the competition for nutrients and water. Depending on seeding rate, space can be less of an issue because of the climbing nature of the cowpeas. They use the sorghum stalks to climb to sunlight, a tendency that is enhanced by their general shade tolerance and ability to wait it out, flourishing in the canopy until they are able to reach the light.

According to *Progressive Forage Grower*, "Intercropping is a system of growing two diverse species of



crops on a piece of land at the same time with the assumption that they improve the efficiency of using both above-ground and below-ground resources compared to growing them separately. As a result, often the total productivity of an intercropping system is more than growing any of the component crops alone." Strictly in terms of biodiversity, this is true. A mix of crops does produce a synergy effect, where the interaction of components improves the end result. It is also better insurance for the season, since environmental conditions that harm one of the species may not affect the other one. Legume taproots are also quite different from the lateral branches of a sorghum plant's root system. Plus, the interplanting practice, with its varied growth styles, ensures more ground coverage from the outset.

It is important to know, however, that the legume is going to take up physical room and use resources that are likely to be limited at some point (such as moisture and nitrogen). Despite appearances of large amounts of material from both species, the sorghum is by far the high yielder in this relationship. Dry matter makes up a greater

proportion of the fresh weight of the sorghum than the cowpeas, so every cowpea plant that takes the place of a sorghum plant or inhibits its production potential is a reduction in yield - however minor.

If you plant a straight stand of forage sorghum, you get greater yield but can expect less protein with adequate moisture and fertility you can typically get a greater dry matter yield per acre and the protein percentage in the sorghum forage will depend on nitrogen fertility (**meaning you may need to supplement protein depending on your livestock classification and needs**). If you include a legume like cowpeas in the mixed stand, you can typically raise the crude protein percentage of the forage mix, but your overall dry matter tonnage per acre of the mix will be lower because the dry matter level per acre of the legume is less than that of the sorghum, and to accommodate both species you have lowered the population of sorghum plants per acre in the mix. So you will need to plant more acreage to get the same amount of dry matter forage. If you plant a mixed stand, you can increase protein by several percentage points, but will need to plant more acreage to get the same amount of forage.

Either way, protein/nitrogen costs money. None of this is to say you shouldn't do it, however. You just need to be aware of the likely protein-yield trade-off and figure out if your soil and climate allows you to supply enough fertility to bump the yield up a little bit.

It comes down to asking yourself, how much benefit are you gaining either way? If you were to measure it, you are likely to gain less in protein on a dry matter basis than you are losing in overall dry matter production. Of course, protein is a much smaller component of dietary needs than carbohydrate energy, so the comparison can get complicated.

In most forage combinations, the addition of a legume or other species added for its high quality (protein, sugars, etc) tends to detract from yield. We see this in many marriages, from pea-oat mix to triticale combined with annual ryegrass for its higher sugars. Yet these mixes continue to thrive in popularity in certain situations, thanks to their elevated quality and feed value. (Quality is a relative term, though, and this depends of course on how you define value, what is the main emphasis in your ration, and whether it is more economical for you to buy or grow various components of the feed). In general, legumes are considered more digestible and high in protein, but are often so rich that they need to be supplemented with plenty of carbohydrates and digestible fiber to complete the diet.)

The key is to include enough fertility and a high enough seeding rate of your “quality additive” to make a difference as a significant part of end yield – considering that the legume/ryegrass/etc. will likely be lower in dry matter content. The nutrients it contributes are, in the end, on a dry matter weight basis.

Forage sorghum is a quick starter, faster than MasterGraze tillering corn, which we have evaluated in combination with cowpeas for several years. It will be able to compete from early growth and may even be too competitive with the cowpeas if the rate is too high. It also grows efficiently with smaller amounts of nitrogen and water.

Sorghum alone will likely have a higher number of leaves, tillers, and taller plants, just because each plant has more space to grow.

Grow for your soils first

On average, cut back both the sorghum and the cowpeas to 50-70% of the recommended straight stand seeding rate. How much you cut it back depends on what your soils can support – what is the soil type, fertility, moisture, and soil organic matter? What does the rest of the rotation look like? On droughty soils with lower fertility and moisture availability, for example, cut back the rate the most, in order to allow the most possible resources for each plant. The poorest soil should have the highest ratio of cowpeas to sorghum, since the sorghum is the heavier feeder of nitrogen and other soil resources.

Adequate fertility (you're growing two crops, after all)

To push early tillering and yield of the sorghum, the field needs adequate nitrogen. Focus especially on boosting nitrogen on soils where manure was not applied and soil organic matter is low. Although cowpeas are a nitrogen-fixing legume, it takes time for the Rhizobium bacteria to infect the soybean root and for the root to develop nodules and begin providing nitrogen to the plant. The exact time period will vary depending on the type of inoculation and upon the soil conditions of temperature and moisture (inoculate with peanut inoculant for best results). It often takes about 21 days to establish nodules, which house the rhizobium bacteria and then begin to fix nitrogen. So in the first 15-30 days, the cowpeas are growing rapidly and taking up free nitrates in the soil and directly competing with the sorghum for this soil-available nitrogen. This aggressive growth period for the cowpeas coincides with a critical stage for the sorghum, when the sorghum plant begins to tiller, and the sorghum should have enough fertility during this time. Also consider that your sorghum will have a relatively short growth span (we recommend either a short season sorghum such as AF 7101 with 50 to 60 days to boot stage/82 to 85 days to soft dough stage, or a full season variety such as AF 7401 with 110 to 115 days to soft dough stage), and there will be less N release from soil organic matter than there would be over the longer lifespan of a full-season corn crop.

Besides the quality boost – why do this?

Organic and conventional growers will benefit the most. For organic growers it allows them to plant the forage sorghum in 15 inch rows which they otherwise couldn't do, because of the need for weed control in straight forage sorghum. For conventional clean till and no-till farmers this allows them to skip a residual broadleaf herbicide or selective grass and broadleaf herbicide since the cowpeas smother weeds. Cowpeas' broad leaves do a good job filling in this space and shading out weeds – yet another benefit to outweigh the competition they pose to the sorghum. As the crop grows, the vines can easily climb and twist in any direction to find the light, naturally filling the blank spots. Cowpeas are also a better fit with one-cut forage sorghum than the more commonplace mix with sorghum sudan, since their regrowth can be poor.

We found the cowpeas especially helpful for weed control when mixed with the MasterGraze tillering corn.

So, it turns out that the choice all comes down to your feed needs, your acreage, your goals, your soil, and a host of other factors unique to your farm. **Weather** is likely to be the biggest influence (and the biggest unknown) in the outcome. Forage sorghum and cowpeas are an innovative and balanced mix that

can round out the quality profile of the sorghum, but like every other crop, finding its proper placement is key.