

# THE FORAGER

*Agronomics with livestock in mind!*

## **A-B-C's of Cover Crops (1)...**

As producers plan, prepare and plant this spring, one option that might be considered is the incorporation of cover crops. Cover crops are defined as any crop grown to provide soil cover, regardless of whether it is later incorporated into the soil for the purpose of soil improvement. There are many potential benefits and advantages to planting cover crops:

- Suppress weeds, disease and nematodes
- Erosion control
- Increase water infiltration
- Recycle nutrients
- Attract beneficial insects
- Reduce soil compaction
- Add organic material
- Increase soil organic matter
- Add nitrogen (N) when using a legume
- Reduce nutrient leaching
- Increase seed yields for crops following the cover crop – for up to 2-3 growing seasons!

Cover crops are ideal when considering the process of “green manuring”, which involves the incorporation of any field or forage crop while it is still green or soon after flowering into the soil for the purpose of soil improvement.

A major benefit obtained from “green manures” is the addition of organic matter to the soil. During the breakdown of organic matter by micro organisms, compounds are formed that are resistant to decomposition – such as gums, waxes and resins. These compounds and the mycelia, mucus and slime produced by the micro organisms – help bind together soil particles as granules, or aggregates. A well-aggregated soil tills easily, is well aerated and has a high water infiltration rate. Increased levels of organic matter also influence soil humus – the substance that results as the end-product of the decay of plant and animal material in the soil. Humus provides a wide range of benefits to crop production. As a rule of thumb, the portion of “green manure” N available to a following crop is about 40% to 60% of the total amount contained in the legume. Dr. Greg Hoyt (North Carolina State University) estimates that 40% of plant tissue N becomes available the first year following a cover crop that is chemically killed and used as a no-till mulch. He estimates that 60% of the tissue N is released when the cover crop is incorporated as a “green manure” rather than left on the surface as a mulch. Lesser amounts are available for the second or third crop following a legume, but increased yields are apparent for two to three growing seasons. Plant residue produces glucosinolates, (produced mainly by the brassica family) which are not toxic, but their breakdown products are. Myrosinase enzymes are responsible for the degradation of glucosinolates, but myrosinases and glucosinolates are located in different compartments of the cell. Tissue damage triggers the “brassica bomb”. Isothiocyanate is the most important breakdown product of glucosinolates and is used in the commercial fumigant Vapan. The activity of this byproduct has shown effectiveness on disease, insects, nematodes and weeds.

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**Brassica** species reduce compaction, recycle nutrients, control weeds and suppress disease. As a cover crop, these are referred to as Biofumigants, since they release isothiocyanate upon damage to their tissue. The process of incorporating fresh residues of brassica species in the soil is called Biofumigation.

To maximize biomass production/glucosinolates content:

- Select the right species: GroundHog Radish, Pasja Forage Turnip, Appin Forage Turnip, Bonar Forage Rape, etc.
- Appropriate seeding rate
- Seeding time (these can tolerate freezing temperatures down to 28° F)
- Initial fertilizer if the soil is poor
- Allow cover crop to grow up to flowering stage (do not allow seed set)

**Legume Cover Crops** are commonly used for nitrogen contribution because of their inherent capacity to fix atmospheric N into usable form to be used by succeeding crops. Nitrogen accumulations by leguminous cover crops range from 40 to 200 lbs. of N/acre. The amount of N available from legumes depends on the species of legume grown, the total biomass produced and the percentage of N in the plant tissue. Cultural and environmental conditions that limit legume growth – such as delayed planting date, poor stand establishment and drought – will reduce the amount of N produced. Conditions that encourage good N production include getting a good stand, optimum soil nutrient levels and soil pH, good nodulation and adequate soil moisture. In general, legumes need phosphorus (P) for N fixation, but are poor scavengers of P in the soil. Since legumes acidify the soil, they tend to make P more available when P is limiting. In general, grass cover crops store and supply more P than legumes, because they have a finer root system and more surface area than legumes with a tap root. In mixed legume-grass pastures, the legume cycles N to the grass and the grass cycles P to the legume (The carbon (C):N ratio of plant tissue reflects the kind and age of the plants from which it was derived. As plants mature, fibrous (C) plant material increases and protein (N) content decreases. The optimum C:N ratio for rapid decomposition of organic matter is from 15:1 to 25:1.)

More in our June issue! *(Edited from an article by AMPAC Seed Company)*

## **SEED – AGRONOMY – NUTRONOMY**

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The chart below suggests cover crops that can be utilized for a specific purpose and several, such as Groundhog-brand Radish, ProMax BMR Hybrid Sudangrass, Pasja and Appin Turnips have multiple attributes for soil improvement and enhancement.

### COVER CROPS FOR A SPECIFIC PURPOSE

| SPECIFIC PURPOSE:                               | ProMax Sudangrass | GroundHog Radish | Turnips: Pasja/Appin Purple Top | Teff | Buckwheat | Winter Peas | Cereal Rye | Annual Ryegrass: Common BRUISER | Oats | Clover: Crimson, Red/White Sweet | Hairy Vetch |
|---|-------------------|------------------|---------------------------------|------|-----------|-------------|------------|---------------------------------|------|----------------------------------|-------------|
| Organic matter                                  | X                 |                  |                                 |      |           |             | X          | X                               | X    |                                  |             |
| Nitrogen fixation                               |                   |                  |                                 |      |           | X           |            |                                 |      | X                                | X           |
| Recapture excess N/P                            | X                 | X                | X                               |      | X         | X           | X          | X                               | X    | X                                | X           |
| Requires NO herbicide to kill                   |                   | X                | X                               |      |           | X           |            |                                 | X    |                                  |             |
| Reduce compaction                               | X                 | X                | X                               |      |           |             |            | X                               |      |                                  |             |
| Quick forage/grazed                             | X                 | X                | X                               | X    |           |             | X          | X                               | X    |                                  |             |
| Droughty soils                                  |                   |                  |                                 | X    | X         |             |            |                                 |      |                                  |             |
| Hay crop  | X                 |                  |                                 | X    |           |             | X          |                                 | X    |                                  |             |
| Weed control / Disease suppression              |                   | X                |                                 |      | X         |             | X          |                                 |      |                                  |             |
| Start-up or enhance no till                     |                   | X                | X                               |      |           |             |            |                                 |      |                                  |             |
| Prevent Soil erosion                            |                   |                  |                                 |      | X         | X           | X          | X                               | X    |                                  |             |
| Natural herbicide****                           | X                 | X                |                                 |      | X         |             | X          | X                               | X    |                                  |             |
| Attracts beneficial insects                     |                   |                  |                                 |      | X         |             |            |                                 |      | X                                |             |
| Tolerate wet soils                              |                   |                  |                                 |      |           |             | X          | X                               | X    | X                                |             |
| Tolerate heat / drought                         | X                 |                  |                                 | X    | X         |             |            |                                 |      | X                                | X           |
| Cold tolerant                                   |                   |                  |                                 |      |           | X           | X          |                                 |      | X                                |             |
| Nurse crops                                     |                   |                  |                                 |      |           |             | X          |                                 | X    |                                  |             |
| Best for broadcasting                           |                   | X                | X                               |      |           |             | X          | X                               |      | X                                |             |
| Low cost to establish                           | X                 | X                |                                 |      |           |             | X          |                                 | X    | X                                |             |
| Requires little management                      |                   | X                | X                               |      |           |             |            |                                 | X    |                                  |             |
| Most winter hardy                               |                   |                  |                                 |      |           |             | X          | BRUISER                         |      |                                  | X**         |
| Requires high management***                     |                   |                  |                                 |      |           |             | X          | X                               |      |                                  | X           |
| Susceptible to or attracts pests and/or disease |                   |                  |                                 |      |           |             | X          | X                               | X    |                                  | X           |

