Using Cover Crops in Your Garder

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Neo-Terra

Experiments in Healthy Living

Image. Cover crops at Neo-Terra in the spring

Introduction

We have been organic gardeners since the early 1990s, when we focused more on landscaping and flowers than food. We became serious organic food growers after taking a biointensive minifarming workshop with John Jeavons in 1997. We now grow 90% of our vegetables and 50% of our fruit.

We have considerable information on organic gardening and biointensive minifarming on other pages of our website, www.neo-terra.org, particularly under Organic Gardening Primer, and Backyard Minifarm PART A and PART B. In addition, feel free to contact us directly or through our website at neoterraexpts@aol.com.

In this primer we will cover three questions:

1. Why cover crops?
2. Which cover crops and when?
3. How do we do this? Techniques and details.

Why Cover Crops?

Cover crops literally cover your soil. Cover crops protect, preserve and improve your soil. In turn, healthy soil creates healthy and productive plants, and these in turn feed you. Cover crops create and improve soil structure, protect your soil from the harsh rays of the sun, help retain moisture, prevent weed growth by shading out weed seedlings, prevent erosion, provide habitat for insects (both beneficial and harmful), provide organic matter to the soil and your compost pile, and provide nitrogen to the soil and successor crops.

John Jeavons uses a more inclusive term, compost crops, which can also provide food. Thus, corn provides large amounts of organic matter, and wheat grown for seed provides flour to make bread and straw for your compost pile. Peas feed us and supply nitrogen to the soil for their own growth and for successor crops.

Cover crops provide all these benefits without you having to resort to purchased fertilizers, synthetic or otherwise. Farmers who desire organic certification agree to use cover crops as one of the practices of good farming. You can act similarly in your backyard or community garden plot.

Which Cover Crops and When?

Years ago no garden seed catalog carried cover crop seeds. Since the passage of the Organic Certification Act the availability of information and seeds has mushroomed. Two of our favorite catalogs have great information on cover crops: Fedco Seeds of Maine, and Peaceful Valley Farm and Garden Supply. Their websites are respectively www.fedcoseeds.com, and www.groworganics.com.

For Fedco (www.fedcoseeds.com), click on “Organic Growers Supply” and then “Download a Catalog” and look in the index for “cover crops.” The summary chart should be on the first page of this section.

For Peaceful Valley (www.groworganic.com) use the menu under “Organic Gardening” and click on “Organic Seeds.” In the horizontal menu at the top of the page click on “cover crops.” On that page you will find a downloadable pdf titled “Solution Chart,” which is great!

Over the years we have used many different cover crops. It is as important to rotate your cover crops as it is to rotate your food crops to prevent disease and pest buildup.

We have put together a Rotation Chart which synthesizes cover crop use and vegetable crops.

Planting Scheme: Rotation/Companion/Antagonist/Cover Crops

Cover Crop	**Main Crop**	**Companions**	**Antagonists**
fava (bell beans) reduces wilts, fixes nitrogen	**Tomatoes, peppers** **⇓ (follows)**	basil, chives/onions, carrots, asparagus, parsley, *marigold*, *nasturtium*	potatoes, cabbage, kohlrabi
Bell beans < corn (fixes nitrogen)	**Corn** **⇓ (follows)**	peas, bush/pole beans, potatoes, squash, cucumbers	
not vetch or legumes < legume – may transmit disease; alfalfa: plant in fall, turn under 2 weeks < beans	**Bush beans.....** **Pole bean .....** **cabbage, collards……** **kale, chard, radish** **⇓**	peas, corn, potatoes, radish, cucumber, strawberry, *marigold*, *summer savory* corn, *summer savory* *dill*, *hyssop*, *mint*, *chamomile*, *oregano*	onions, garlic onions, beets, kohlrabi, garlic tomatoes, pole beans, strawberry
barley, rye ……..	**Roots: onions…….** **carrots. .....** **beets .....** **turnips .....** **⇓**	beets, *chamomile (sparsely)*, *summer savory* tomatoes, lettuce, parsley, onions, radishes, peas, *chives*, *flax* lettuce, cabbage, onions, radishes, peas	beans & peas *dill* pole beans, potatoes
	Greens: lettuce **⇓**	carrots, radish, beets, cilantro	
no oats,barley or peas! (scab); soybeans reduces scab; rye	**Potatoes** **⇓**	bush beans, corn, eggplant, *flax*, *marigold*	peas, squash, tomatoes, cukes, *sunflowers*, raspberries
Bell beans<corn (fixes nitrogen)	**Corn** **⇓**	peas, bush & pole beans, potatoes, squash, cucumbers	
Not vetch, not legumes<legume	**Peas** **⇓**	bush beans, corn, radish, turnips, cucumbers	potatoes, onions, garlic, *glads*
	Broccoli, cauliflower **⇓**	potatoes, celery, beets, onions *dill*, *chamomile*, *sage*, *peppermint*, *rosemary*	strawberries, tomatoes, pole beans
	Squash, melons **⇓**	Corn, *nasturtiums*	

1. Guidance from Jeavons, "How to Grow More Vegetables" and Coleman, "The New Organic Grower"
2. Plant names in italics are herbs or flowers, non-italics other vegetable crops

How Do We Do This? Techniques and Details

So, you have the benefits, you have the crops. How do we use cover crops? What, specifically do we do?

Let us look at an idealized garden plot, in your backyard or at a community garden. The following diagrams illustrate several integrated principles: rotation, cover crops, and four year intervals between plantings of the same crops in the same spots (especially important for members of the tomato family – tomatoes, peppers, potatoes, eggplant). We use the term "solanines" to stand for members of the tomato family, and have outlined their planting areas in red.

The Concept Diagram. In the Concept Diagram imagine you divide your garden area into quadrants. Then imagine alternating your plantings from one side to the other. Thus, in the spring of Year 1, you will plant your vegetables in the left-hand side. In Year 2, you will plant your vegetables in the right-hand side. Similarly, since you will be using cover crops to improve your soil, you plant these in the right-hand side in Year 1, and then in the left-hand side in year 2.

In the fall of Year 1, you clean your vegetable beds and plant cover crops for the fall and winter. You can also plant fall vegetables in one of the right quadrants, that area having been improved by your spring planting of cover crops.

Notice how tomatoes rotate through each of the four quadrants. This leaves four years before returning tomatoes (and other solanines) to the upper left quadrant. We do similarly for fall vegetables, to avoid buildup of diseases and insect pests from planting the same vegetables in the same spots.

The Garden Bed Layout. In the second diagram, we translate this Concept Diagram into a bed layout for a small garden plot, of the sort you might find at a community garden or in your own backyard. With these principles, you can adapt these to your own circumstances. Following biointensive practices, we lay out permanent beds and paths. Arrange your beds along a north-south axis. This way, the sun shines on both long sides of the bed as it moves from east to west.

In our experience, a 2' wide path is about the most narrow that can be easily navigated by individuals, especially with a wheelbarrow. This leaves the width of the beds at 4 feet. Since many gardeners like growing tomatoes (and peppers, potatoes and eggplant), we have highlighted this vegetable family in red, because it is important to keep at least four years between plantings of members of this family in the same spot. This prohibition extends to all members of the same family, as these share the same diseases. In the first map, we have shown four years between plantings of tomatoes in the same spot.

In our opinion, backyard gardeners plant too many tomatoes. You are likely not going to be self-sufficient in tomatoes and keep the required spacing between successive plantings of tomatoes or other members of the tomato family in a small 20' x 30' garden plot. In addition,

tomatoes are highly acidic, and many individuals suffer digestive distress when eating too many. Finally, tomatoes are prone to a number of diseases, especially fungal diseases exacerbated by the humid conditions during northeastern summers. It is important, therefore, to give your tomato plants plenty of room to promote air circulation.

The compost bin shown in the diagram has three compartments, with removable dividers between compartments. This allows two turnings from start to finish. As you transfer organic matter from the first to the second compartment, this frees up the first compartment for a fresh batch of organic matter.

The area labeled “sod pile” refers to the portions of the bed where you skim your cover crop turf after cutting your cover crops to the ground for the last time. You will cut your turf into squares and stack these on your sod pile. As a practical matter, you may want to build a 4-sided enclosure (with slats and openings to promote air circulation) to keep the sod from spilling onto the paths as the organic matter decomposes. When done, you will have an incredible soil useful as an ingredient in your potting mix, as an addition to your compost pile to inoculate organic matter, or to turn back into your beds.

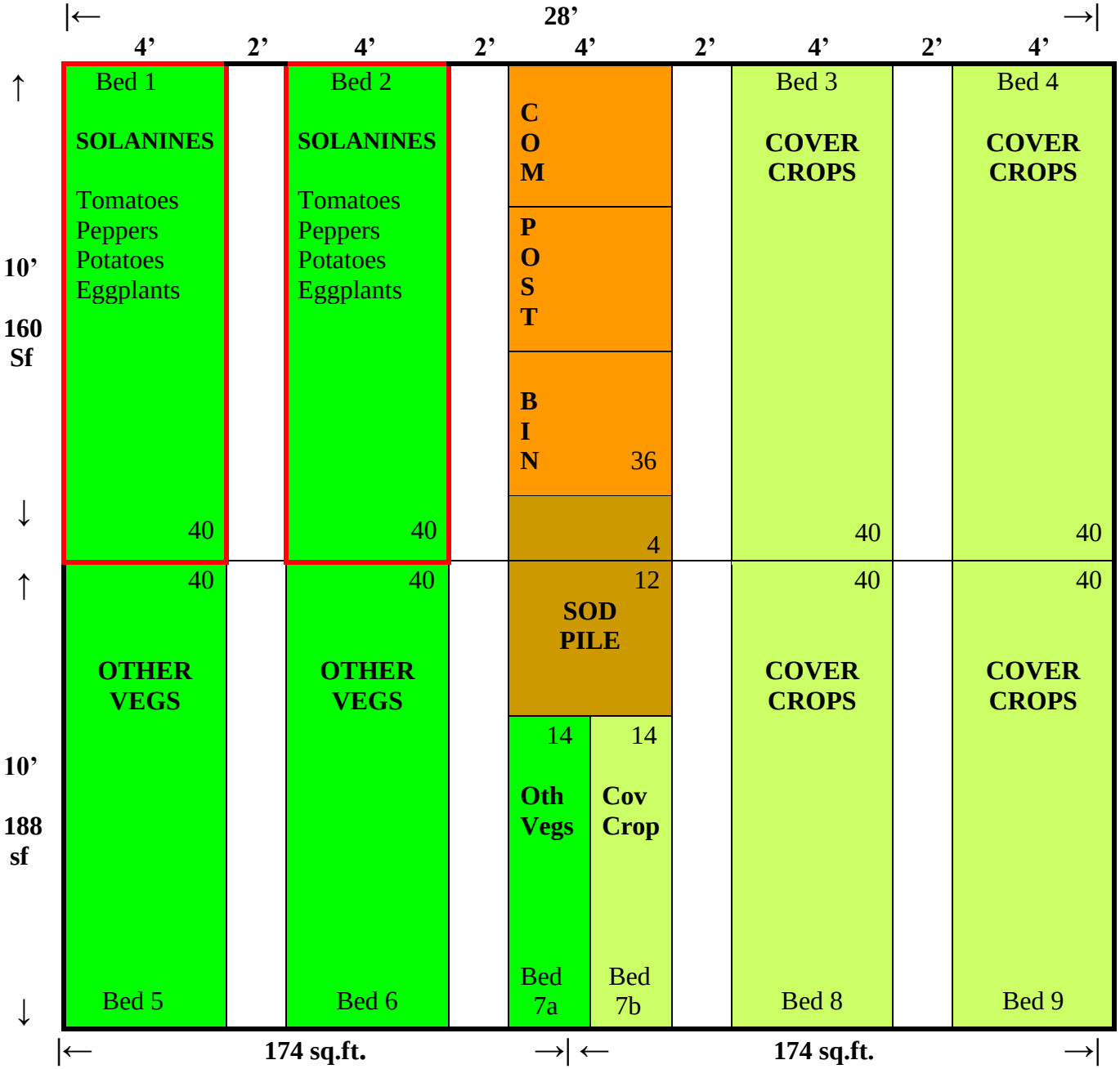
Skimming turf applies to overwintering cover crops, such as rye and vetch, and spring cover crops. You can get 2-4 cuttings from your cover crops, a cutting taken 6-8” from the ground, the green tops chopped into 3-9” lengths, and mixed immediately into your compost bin compartment as you turn (best used if you have lots of brown material, as the “hot” green material helps the colder brown material break down faster, due to the former’s high nitrogen content). If you wait until the cuttings lose their color, you will be losing the nitrogen content.

CONCEPT DIAGRAM FOR BED LAYOUT & CROP ROTATION

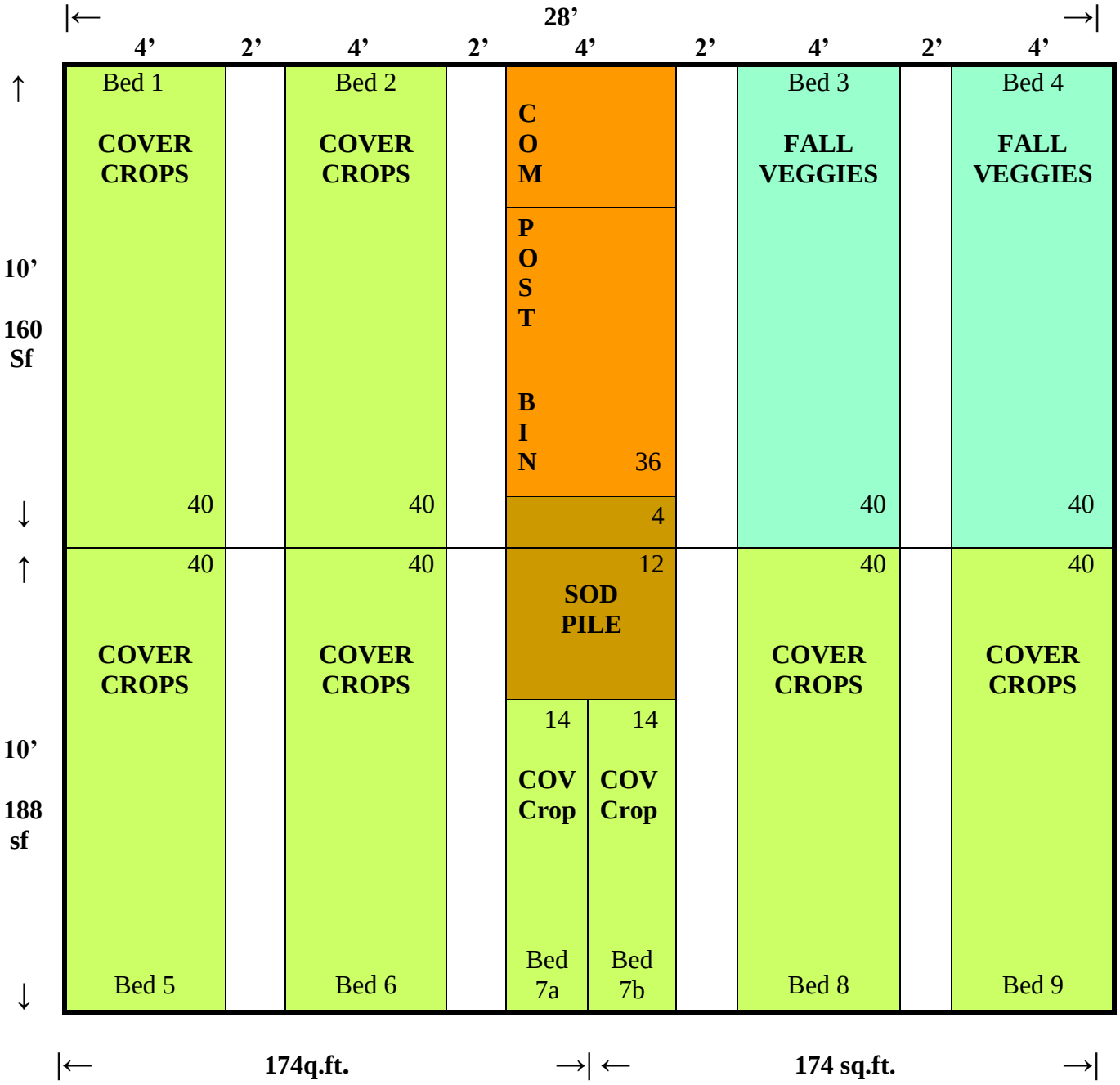
	Spring		Fall	
Y1	Solanines	Cover Crops 5/7-7/31 9/1-11/30	Cover Crops 9/16-11/30 3/1-4/30	Fall Vegs
	Other Vegs	ditto	ditto	Cover Crops 9/1-11/30 3/1-4/30
Y2	Cover Crops 5/7-7/31 9/1-11/30	Solanines	Fall Vegs	Cover Crops 9/16-11/30 3/1-4/30
	Cover Crops 5/7-7/31 9/1-11/30	Other Vegs	Cover Crops 9/1-11/30 3/1-4/30	ditto
Y3	Other Vegs	Cover Crops 5/7-7/31 9/1-11/30	Cover Crops 9/16-11/30 3/1-4/30	Cover Crops 9/1-11/30 3/1-4/30
	Solanine	Cover Crops 5/7-7/31 9/1-11/30	ditto	Fall Vegs
Y4	Cover Crops 5/7-7/31 9/1-11/30	Other Vegs	Cover Crops 9/1-11/30 3/1-4/30	Cover Crops 9/16-11/30 3/1-4/30
	Cover Crops 5/7-7/31 9/1-11/30	Solanine	Fall Vegs	ditto

Cover crop ratio: 54%. Jeavons states that 60% realizes self-sufficiency in compost.

GARDEN BED LAYOUT FOR A 20’ X 28’ GARDEN PLOT: YEAR 1 SPRING – SUMMER



FALL – WINTER YEAR 1



Action Guidelines

1) The cover crops you will use this fall depend on what, when, and where you will plant crops in your garden next year. Thus, you will require a garden plan with associated map. Use the Concept Diagram and Garden Bed Layout to help you design your garden and rotation plan.

2) For early spring or cold weather crops such as lettuce, spinach, beets, carrots, collards, parsley and dill, plant oats and hairy vetch (not crown vetch) in the fall, aiming for seeding dates between late August and late September. Oats does its growing in the late summer and fall. It winter kills, leaving the vetch to come back next late winter and early spring. The oats adds organic matter and the vetch provides nitrogen. Just before planting your crops in the spring rake off the dead oats and add to your compost pile; cut the vetch to the ground, adding that to your compost pile; skim the beds; and add required compost and any minerals to meet deficiencies as indicated in your soil test report.

3) For summer or warm weather crops such as tomatoes, squash, corn and beans, plant the following combinations: rye and vetch, winter wheat and vetch, or oats followed in the spring by fava (bell) beans. Aim for planting dates from September 1 to mid to late October, tending toward the earlier dates, particularly if your site gets fall shade. For spring-planted fava (bell) beans, aim for early April. We use April 6. Soak and rinse favas daily for 2-3 days. Use an appropriate inoculant.

4) The rye and winter wheat, together with the vetch, get a start in the fall, and come back for their main growing in the late winter and spring. You can get 2-3 cuttings from these cover crops which you add to our compost pile. Cut before the cover crop gets too tall; otherwise it lodges, or falls over, making it difficult to cut. We cut at around 18-24” down to 6-8” using grass shears or pruners.

5) Three weeks before you plant your summer crops, make your final cut to the ground, and skim the bed. This gives time for the roots to decompose, softening the soil magically. Then add your compost and minerals as before.

6) I mentioned skimming your beds prior to adding compost and minerals. To do this, use a spading shovel (blunt edge) and a digging board (e.g, 3’x4’ ¾” exterior grade plywood) to protect the soil from compression. Make two cuts with the spading shovel, one at the end of the cover crop section and another slightly wider than the shovel spade after this one. Further, divide the delineated rectangle into small squares. Kneeling on the digging board or on the path facing the bed, push your spading shovel down and across the bed, just below the thick turf, and sever the top from the roots. You will find a sweet spot where it is easy to skim without taking too much turf. We lay these in a wheelbarrow and pile up carefully onto our sod pile, top side down, where they compost.

7) Do not precede a legume such as peas or beans with a legume cover crop. Thus, you would not use vetch before peas. Instead, use oats before peas and rye or winter wheat before beans.

8) Use inoculant on all nitrogen-fixing seed (unless you purchase seed with the inoculant already stuck to the seed). There are different inoculants for different seeds, so get the right ones.

9) How much cover crop seed to use?

Cover Crop Weights

Cover Crop	100 sf wt	100 sf cups	125 sf	40 sf
vetch	11 oz	1.75 c	13.5 oz	4.5 oz
rye	12.8 oz	1.25 c	16 oz	5.1 oz
oats	12.8 oz	1.25 c	16 oz	5.1 oz
field peas	6.4 oz	1 c	8 oz	2.6 oz
buckwheat	9.6 oz	1.5 c	12 oz	3.8 oz
fava 8”	6.3 oz	1 c	7.9 oz	2.5 oz
fava 6”	12 oz	1 7/8 c	15 oz	4.8 oz

If use mixture (e.g., oats and vetch), then cut each seed amount to 1/2.

10) How to sow cover crop seeds?
   a) For all seeds, clean bed and loosen soil with twisting motion of a spading fork.
   b) For grasses, measure out amount, broadcast evenly, chop in with a garden rake.
   c) For legumes (bell beans and vetch), soak and rinse daily for 2-3 days, drain just before use, apply inoculant to wet seed and stir to ensure coverage of inoculate, and plant. For vetch, broadcast and chop with grass cover crop. For favas, plant 7” apart in triangles or offset rows.
   d) For all cover crops, spritz daily in warm weather to improve germination. Do not water after late afternoon, as you will encourage slugs, which will devour seeds and newly germinated seedlings.

11) Jeavons has determined that if you use cover crops 60% of the time you will be self-sufficient in organic matter, and will not have to add compost. This number is called the “cover crop ratio.” The cover crop ratio for the Garden Bed Layout shown above is 54%. For details on calculating this number, see the Organic Gardening Primer page, end of Part 2, where you will find a table labeled “Calculation of Cover Crop Ratio.”

12) Treat your cover crops as seriously as your main food crops. Without good cover crops, you cannot raise good food crops. This means following the calendar. You will not be leaving your tomatoes in until November 1 to get that last tomato, because by that time your fall cover crops will not have sufficient day length or warmth to germinate and get established. This is particularly true for oats, which does all its growing in the fall.

13) In addition to our web page, “Organic Gardening Primer,” we also give two talks through Centre Region Parks and Recreation in the late winter and early spring. If you are interested in receiving the dates for these, email us and we will let you know in February or so when the talks will be held.

Images to Illustrate Our Use of Cover Crops

Tania and Gene cutting rye and vetch to the ground prior to skimming

Tania turning in freshly cut cover crops

Our sod pile

Cover crops: vetch and rye, fava, fava cut prior to turning in, freshly aerated bed