

METHODOLOGY FOR DETERMING CALORIC AND BIOMASS YIELDS FOR GROWING AREAS:

Determining Gardenable Areas:

- Map: A large-format 3’x4’ map of Fort Bragg, CA was printed out using a high-resolution file obtained from the City of Fort Bragg
- A higher resolution digital image was referenced to increase accuracy in determining green space
- Open green spaces were subtracted from the map and arranged according to their land use designation
- Total square-foot space was measured for subtracted zoned areas and a conservative estimate of 45% of total land was assumed unsuitable for growing based on shade and other factors

Determining a Basic Garden Plan and Yields:

- A sample garden bed measuring 100 Sq. Ft was developed based on crops well-suited to the growing climate and soils of Fort Bragg, CA
- 64 crops were analyzed for their carbon and calorie yield potentials based on basic, intermediate and advanced-level yield data taken from the research of Ecology Action and Victory Gardens for Peace. This data can be found in the Master Charts of John Jeavon’s book, How to Grow More Vegetables 9th ed.

Category	Plant	Calorie/ lb.	Edible Yields(lbs.)/100sqft			Total Calories Produced			Total Biomass(lbs.)/100sqft		
			Basic	Interm.	Adv.	Basic	Interm.	Adv.	Basic	Interm.	Adv.
Fruits and Vegetable Crops for Flavor and Nutrition	Apple	242	50	75	100	12100	18150	24200	10	19	38
	Artichoke	213	15	25	30	3195	5325	6390	-	-	-
	Arugula	118	90	180	270	10620	21240	31860	-	-	-
	Asparagus	104	9.5	19	38	988	1976	3952	-	-	-
	Beans, Dry	1583	4	10	24	6332	15830	37992	-	-	-
	Beans, Runner	1510	4	10	24	6040	15100	36240	-	-	-
	Beets	195	110	220	540	21450	42900	105300	-	-	-
	Blackberries	264	24	36	48	6336	9504	12672	7.5	15	30
	Blueberries	259	19	37	75	4921	9583	19425	7.5	15	30
	Broccoli	127	26	39	53	3302	4953	6731	-	-	-
	Brussels Sprouts	195	71	106	142	13845	20670	27690	-	-	-
	Cabbage	113	96	191	383	10848	21583	43279	-	-	-
	Carrots	195	100	150	400	19500	29250	78000	-	-	-
	Cauliflower	113	44	100	291	4972	11300	32883	-	-	-
	Celery	73	240	480	959	17520	35040	70007	-	-	-
	Chard	86	200	405	810	17200	34830	69660	-	-	-
Collards	136	96	191	383	13056	25976	52088	-	-	-	
Corn, Sweet	400	17	34	68	6800	13600	27200	-	-	-	
Cucumbers	59	158	316	581	9322	18644	34279	-	-	-	

	Currants	240	12	18	24	2880	4320	5760	5	10	25
	Fig (Fresh, not dried)	363	12	24	36	4356	8712	13068	10	19	38
	Garbanzo	1651	4	10	24	6604	16510	39624	-	-	-
	Grapes (Fresh, not dried)	270	45	67	90	12150	18090	24300	7.5	15	30
	Kale	227	76	114	153	17252	25878	34731	-	-	-
	Kohlrabi	122	67	135	270	7504	16470	32940	-	-	-
	Lentils	1569	4	6	8	6276	9414	12552	-	-	-
	Lemon	82	75	112	150	6150	9184	9184	10	19	38
	Lettuce	59	75	150	300	4425	8850	17700	-	-	-
	Melons	159	50	72	145	7950	11448	23055	-	-	-
	Mustard	118	180	225	270	21240	26550	31860	-	-	-
	Onions	172	100	200	540	17200	34400	92880	-	-	-
	Parsley	163	45	91	182	7335	14833	29666	-	-	-
	Pear	252	36	72	108	9072	18144	27216	10	19	38
	Peas (Fresh, not dried)	367	25	53	106	9175	19451	38902	-	-	-
	Peppers	82	68	136	204	5576	11152	16728	-	-	-
	Plum	272	19	38	57	5168	10336	15504	10	19	38
	Pumpkins	118	48	96	191	5664	11328	22538	-	-	-
	Radish	91	100	200	540	9100	18200	49140	-	-	-
	Raspberries	321	12	18	24	3852	5778	7704	5	10	25
	Rhubarb	95	70	140	280	6650	13300	26600	-	-	-
	Rutabaga	163	200	400	800	32600	65200	130400	-	-	-
	Scallions	145	100	200	540	14500	29000	78300	-	-	-
	Spinach	100	50	100	225	5000	10000	22500	-	-	-
	Squash	171	50	100	350	8550	17100	59850	-	-	-
	Strawberries	161	40	80	160	6440	12880	25760	-	-	-
	Tomatoes	95	100	194	418	9500	18430	39710	-	-	-
	Turnip	122	100	200	360	12200	24400	43920	-	-	-
	Zucchini	64	160	319	478	10240	20416	30592	-	-	-
	Average for Fruits and Vegetables					9645	20464	35886	2	3	6
Area Efficient Calorie Crops	Garlic	676	60	120	240	40560	81120	162240	7.5	15	30
	Jerusalem Artichokes	345	100	206	460	34500	71070	158700	7.5	15	30
	Leeks	277	240	480	960	66480	132960	265920	7.5	15	30
	Parsnips	340	119	238	479	4046	80920	162860	-	-	-
	Potatoes	349	100	200	780	34900	69800	272220	-	-	-
	Salsify	372	100	200	400	37200	74400	148800	-	-	-
	Sweet Potatoes	375	82	164	492	30750	61500	184500	-	-	-
	Average for Area Efficient Calorie Crops					35490	81681	193606	3	6	13
W eigh t Eff	Amaranth	1696	4	8	16	6784	13568	27136	12	24	48
	Barley	1583	5	10	24	7915	15830	37992	12	30	72

Beans, Fava	1547	5	9	18	7735	13923	27846	18	36	72
Corn, Flour	1656	11	17	23	18216	28152	38088	24	48	96
Oats	1764	3	7	13	5292	12348	22932	12	30	72
Quinoa	1600	6	13	26	9600	20800	41600	18	39	78
Rye, Cereal	1520	4	10	24	6080	15200	36480	12	30	72
Sunflower	2585	2.5	5	10	6463	12925	25850	20	40	80
Triticale	1520	4	10	24	6080	15200	36480	12	30	72
Wheat	1492	4	10	26	5968	14920	38792	12	30	72
Average Weight Efficient Calorie and Carbon Fixing Crops					8013	16287	27087	16	34	75

- Crops were placed into categories based on their production values. The table below shows the average calorie and biomass production levels for the crop categories to create a standard criterion for analysis.

Category	Calories/100sqft			Biomass lbs./100sqft		
	Basic	Interm.	Adv.	Basic	Interm.	Adv.
Fruits/Vegetable	9645	20464	35866	2	3	6
Area Efficient Calorie Crops	35490	81681	193606	3	6	13
Weight Efficient Calorie and Carbon Fixing Crops	8013	16287	27087	16	34	75

- In a category of crops we refer to as weight efficient calorie and carbon fixing crops, we describe crops which are growing tall, fixing enough carbon to replenish what is lost through cultivation. These crops are necessary for ensuring sufficient compost materials are grown in the garden.

Compost Application Goals Produced Through Biointensive Composting and Carbon Cropping					
Chart Adapted from How to Grow More Vegetables by John Jeavons, 9 <sup>th</sup> ed. 2017					
Yield Level	Wet-Weight of Biomass/100sqft	Dry-Weight of Biomass/100sqft	Compost Produced/Bed*		
			5-Gallon Buckets	Cubic Feet	Depth
Basic	90 lb.+	15 lb.+	1.5	1	1/8"
Intermediate	180 lb.+	30 lb.+	3	2	1/4"
Advanced	360 lb.+	60 lb.+	6	4	1/2"

\*At least 5 beds are needed in 60/30/10 cropping to create a sufficient-sized compost pile for composting, some soil is included in the compost building process.

- From the crops studied, a cropping plan growing 60% of the area in weight efficient calorie and carbon crops, 30% in area efficient calorie crops and 10% in fruit and vegetable crops was developed. 60% crops are growing food for ourselves and

compost materials, 30% are growing area efficient crops which grow high amounts of calories per unit of time and space, and 10% growing area is designated for fruit vegetable crops for nutrition and flavor.

Vegetable Category	Planting Area (sq. ft)	Calories per Average Planting			Biomass (lbs.) Production per Average Planting		
		Basic	Interm.	Adv.	Basic.	Interm.	Adv.
Fruit and Vegetable Crops	10	964.5	2046.4	3586.6	0.2	0.3	0.6
Area Efficient Calorie Crops	30	10647.0	24504.3	58081.8	0.9	1.8	3.9
Weight Efficient Calorie and Carbon Fixing Crops	60	4807.8	9772.2	16252.2	9.6	20.4	45
Total	100	16419.3	36322.9	77920.6	10.7	22.5	49.5

- Calorie and Carbon Yields calculated from this average cropping plan were applied per Sq. Ft

	Calorie Production			Biomass Production		
	Basic	Interm.	Adv.	Basic	Interm.	Adv.
Average	164.2	363.2	779.2	0.1	0.2	0.5
3-Crop Plan Potatoes (Spring), Barley (Summer), Fava Beans (Overwinter)						
Potatoes	349.0	698.0	2722.0	-	-	-
Barley	79.2	158.3	379.9	0.1	0.3	0.7
Fava (Compost)	-	-	-	0.1	0.1	0.2
Total	428.2	856.3	3,101.9	0.2	0.4	0.9

RESULTS:

Total Gardenable Land 2,140,625 Sq. Ft	Cropping	Yield	Total Calories	Calories per Person per Year	Annual Persons Sustained	Total Biomass (lbs.)	Total Carbon Fixed (lbs.) *	
	Average 1-Crop/Year	Basic		351,490,625	730,000	481	214,063	64,219
		Intermediate		777,475,000	730,000	1,065	428,125	128,438
		Advanced		1,667,975,000	730,000	2,285	1,070,313	321,094
	3-Crop Plan	Basic		916,615,625	730,000	1,256	428,125	128,438
		Intermediate		1,833,017,188	730,000	2,511	856,250	256,875
		Advanced		6,640,004,688	730,000	9,096	1,926,563	577,969
<p>*Assuming dry weight yields are 50% Carbon, and a conservative estimate of 1/3<sup>rd</sup> oxidized after cold composting. This does not factor carbon offset by becoming a food and soil producer instead of a consumer in the globalized food system. A conservative estimate of an average American dietary carbon footprint is 4,000 lbs. of CO<sub>2</sub> annually. By becoming a producer, rather than a consumer and growing in the 60/30/10 ratio of garden planning, it is possible to keep those 4,000 lbs. in the ground while also fixing a significant amount of carbon.</p>								