THE BACH BIODYNAMIC PLANTING AND RESEARCH CALENDAR

Based on Indications Given by Rudolf Steiner

2014

Introduction

Welcome to the second annual edition of the Bach Biodynamic Planting and Research Calendar. The intention of this calendar is provide a broad-based research platform, where you, the gardener or farmer can participate in simple planting trials with the intention of finding the best times to sow seeds based on lunar cycles. This year's calendar will continue to explore two basic biodynamic approaches to sowing based on cosmic influences. The first approach is sowing using the synodic rhythm indicated in *The Agricultural Course* by Rudolf Steiner[1]. The synodic rhythm is the familiar course that the moon takes in its orbit around the earth, with the different phases it passes through over approximately 29.5 days. Steiner spoke of how the waxing phase (when the moon is becoming larger and larger, culminating in a full moon), and in particular two days before the full moon, was the best time to sow seeds. In lecture one of *The Agricultural Course* Steiner spoke as follows: "…with the forces that come from the Moon on days of the full Moon, something colossal is taking place on the Earth. These forces spring up and shoot into all the growth of plants, but they are unable to do so unless rainy days have gone before...the Earthly forces of growth are feeble and unable to sustain plants. Through the forces of the Moon, the forces of growth are strengthened to the point where they can then become reproductive forces" [i.e. to be able to produce seed] (p. 109). Conversely, the forces of the moon are weakest during the waning phase, moving towards new moon. Lili Kolisko subsequently conducted many experiments comparing the waxing and waning phases of the moon, and these have been published in her extensive book *Agriculture of Tomorrow.* She found that seeds had higher germination rates, developed more rapidly, and the subsequent plants were larger and yielded more during waxing phases, specifically two days before a full moon. Unfortunately, this book is now out of print, but it is offered as an online download from several websites. I do not know if these sites are offering this book legally.

In contrast to this, Maria Thun focused on the moon's passage through the various constellations, and gave a different approach to Steiner's through research that she conducted in the 1950s. Over the years, Thun developed a theory that plants grew and developed differently when the moon was in one of the twelve zodiacal constealltions. She grouped the twelve signs of the zodiac into four trigons (a trine is a 120° angle, formed, in this case, between the different constellations). As the moon travels through these four trigons, each with three constellations, different crops are gown by type. The groupings are as follows:

Root crops (Earth element): Taurus, Capricorn, Virgo
Leaf crops (Water element): Cancer, Pisces, Scorpio
Flower crops (Light element): Gemini, Aquarius, Libra
Fruit/Seed crops (Fire/warmth element): Aries, Leo, Sagitarius

[1] This series of lectures, given in 1923 is available at www.rsarchive.org for free.

Last year's calendar began the process of exploring these two rhythms, and for the most part, more favourable results were obtained when seeds were sown during the waxing phase. There were problems that occurred in some of the trials (slug attacks, suspected adverse influences from lunar eclipses being the most problematic), so the results can only be considered as a first step in understanding these influences, and as a guide to further research, which this year's calendar will attempt to continue and deepen. Details of last year's results can be found in the last half of this calendar, or on my website at www.bachbiodynamics.com.

Theme of the Year

This year's theme will again explore Steiner's waxing-waning phases as compared with Thun's trigons. The plantings this year will all be sown in the prime gardening months of April, May and June. Last year, trials began in January, but the plants grew spindly and weak due primarily to low light levels available in windowsills during winter months. This research provided some valuable data, but the plants themselves did not grow as well as they would have later in the year, and thus the data was not as good as it could have been. This year, farmers and gardeners can chose to plant indoors or in a greenhouse, and then transplant, or direct sow outdoors, whichever method is preferred by you, the researcher. What must be borne on mine is that the same practices must be carried out for each phase of a single trial. For example, if lettuce is planted indoors in trays and transplanted out two weeks after for the first portion of a trial, then all subsequent lettuce must be treated in the same way for the rest of the sowings for that trial. Attempts should be made to ensure that that all plants receive the same amounts of light and water, and be planted in the same soil. It is also of the greatest importance that the same seeds be used for all phases of a single trial, preferably from the same packet or saved seed collection. Each trial will consist of 6 sowings, with each sowing consisting of 12 seeds. Therefore, 72 seeds will be needed to complete each monthly trial. The following vegetables will be used for each trial:

April – Radishes
May- Lettuce
June- Bush Beans

I will be using fast maturing, open pollinated (OP) varieties, so the harvest dates indicated in the calendar are specific to these types. For example, the lettuce variety that I am using has a harvest date 45 days from germination. I add 5 days to include the time needed for germination, and so have a harvest date 50 days from the sowing date. The varieties that I am using for the trials are from West Coast Seeds, in Vancouver, B.C. They are as follow:

Trial 1 -Radishes: RD680 French Breakfast OP Heirloom – 25-30 days + 5 days germination: 35 days total
Trial 2- Lettuce: LT442 Breen OP Organic – 45 days + 5 days germination: 50 days total
Trial 3 - Bush Beans: Strike BN101 OP– 55 days + 5 days germination: 60 days total

You can chose any variety you like, but I would recommend using varieties that have maturity dates similar to the ones that I have used. West Coast Seeds ships to Canada and the U.S. To keep things simple when it comes to collating all of the data, please use the harvest dates that are provided in the calendar, even if they are a few days different from the seeds that you are using. These dates are only estimates, and weather conditions can vary maturity dates significantly.

The sowing dates of this calendar are timed so that there two consecutive sowing dates prior to both the full and new moon. Thus, there will be data for both the strongest and weakest times in the synodic rhythm. These dates also include corresponding and non-corresponding trigon sowing times in both the waning and waxing planting times. There are also plantings that occur on apogee (when the moon is furthest from the earth) and on perigee (when the moon is closest to the earth). I believe that this cycle also influences the growth of plants, with perigee having a positive influence on germination and growth, as was found by the work of Harmut Spiess. This contradicts the Thun approach, which sees perigee as a time to be avoided for sowing. Perigee is designated as a no plant time in Thun-style planting calendars.

Grey areas on calendar dates indicate sowing days, while dates with thick borders indicate harvesting times. In April, the month of the first trial, where radishes are planted, there are six sowing times, and, because it is the first trial, no harvesting times. May, however, becomes more complicated, as there are six sowing times for trial two (lettuce), but also six harvesting dates for the first radish trial. On May 18th, there is both a sowing day for lettuce, and a harvesting day for radishes. Please do not feel that you need to complete all of the trials in order to participate in this research. Completing any single trial is of great value, and allows for the often busy summer schedules people have.

Important Points to Remember when Gathering Data

- Always collect data on the dates indicated
- Wash dirt off of plants, and allow to dry for a half an hour, or dry with a paper towel before weighing or measuring
- Always weigh and measure plants on the same day they are harvested
- Please include seed information (name of grower, name of variety) or if the seed is your own that has been saved

Continued page 6

January 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 New Moon - 03:14 Perigee- 13:01 ☾☌♃ -11:09	2	3	4
5	6	7 ☾☌♂ - 13:54	8	9	10 ☾☌♄ -11:07	11 Best Planting times- Jan 11-13
12	13	14	15 Full Moon- 20:52 Apogee- 17:51 ☾☌♀-06:16	16 ☾☌☿-23:16	17	18
19	20	21	22	23	24	25
26	27	28 ☾☌♃-17:06	29	30 New Moon 13:39 Perigee- 1:58	31	

Notes:

About Best Planting Times

This calendar contains a range of dates (between 2-4 days each month) that are the best times for sowing seeds, as indicated by Rudolf Steiner. These days always fall somewhere between 6-2 days before a full Moon. The Moon is here considered to be the greatest force that influenes the growth of plants. In the first lecture of *The Agricultural Course* Steiner also indicated that the inner (Mercury and Venus) and the outer (Mars, Juptiter and Saturn) planets also influenced the growth of plants. Generally, the inner planets influence the growth of annual plants, while the outer planets influence the growth of longer lived plants, specifically, plants with bark or rind. He spoke specfically, for exmple, of how Oak trees are related to the forces of Mars, while confierous trees are related to the forces of Saturn. Still in the first lecture, Steiner also spoke of the relationship of silica and limestone forces to the planets. The inner planets carry the forces of limestone into the earthly realm, while the silica forces are carried by the outer planets. Steiner spoke of the limestone forces as contributing ultimately to the formation of seeds. Thus the inner planets are connected to the development of seed crops. These would include, for example, pod plants (peas, beans, etc), corn, and the various grains. In short, these are the plants whose seeds we consume. The silica forces of outer planets work on the development of plants that Steiner described as being foodstuffs for animal and man. Plants in this group are not eaten for their seeds, but the food they produce. Examples include root crops (carrots, beets, potatoes, etc.), and the flesh of fruits and vegetables (apples, squash, melons, tomatoes, etc.). These plants are referred to as nutritive crops in this calendar.

The moon is the force that ulimatley magnifies and directs the forces of these planets to the earth. Steiner described this in leture six of the *Agricultural Course* as taking place when the Moon 'reflects' the forces of the planets to the earth. This takes place when the Moon is in opposition to a planet, and thus shines these forces onto the earth. A full Moon, is, for example, an opposition between the Sun and the Moon, with the Earth in the middle. Thus, the rays of the Sun are transformed and amplified onto the Earth during a full Moon, bringing about forces of growth in plants. This is also the case for the various planets. Therefore, during a waxing phase of the Moon, if there is also a corresponding innner or outer planet moving into opposition with the Moon, these forces will also be cast onto the Earth. Steiner spoke of two days before a full Moon as the time when the forces of growth carried by the Moon were strongest. I assume (Steiner did not directly state this), that two days before a planetary opposition is also when the forces of a planet are strongest. Hopefully over time this can be established through research.

Continued page 8

February 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4 ☾☌♂-15:14	5	6 ☾☌♄-20:49	7	8
9	10 Best planting days Feb 10-12	11 Apogee 9:00 pm ☾☌☿-06:20	12	13	14 Full Moon - 3:53 pm ☾☌☿-19:13	15
16	17	18	19	20	21	22
23	24 ☾☌♃-11:23	25	26	27 Perigee- 11:43 am	28	

Notes:

Thus, any outer lunar-planetary opposition that occurs during a waxing phase should be considered as an ideal time to plant nutritive crops (root crops, melons, cucumbers, squash,etc.), while any inner lunar-planetary opposition during a waxing phase should be considered as an ideal time to plant annual seed crops (peas, corn, beans, grains, etc.). The following chart indicates the best times to plant and also to apply the biodynamic preparations 500 (calcium-limestone forces), and 501 (silica forces).

Crop/Prep	Good	Better	Ideal
Annual Seed Crops (peas,corn,beans, grains,etc.)	Two days before a full Moon	Two days before a full Moon with recent rainfall	Two days before a full Moon with recent rainfall *and* an opposition between Moon and inner planet(s)
Annual Nutritive Crops (root crops, melons, squash, cucumbers, etc.)	Two days before a full Moon	Two days before a full Moon with rainfall and seasonally warm conditions prevailing	Two days before a full Moon with rainfall, seasonally warm conditions prevailing, *and* an opposition between the Moon and *both* an inner and outer planet(s)
BD 500- making and application of	Opposition between the Moon and an inner planet(s)	Opposition between the Moon and an inner planet(s) and recent rainfall	Opposition between the Moon and an inner planet(s) and recent rainfall during a waxing Moon
BD 501-making and application of	Opposition between the Moon and an outer planet(s)	Opposition between the Moon and an outer planet(s) and prevailing warm conditions	Opposition between the Moon and an outer planet(s) and prevailing warm conditions *and* a waxing Moon

Continued page 10

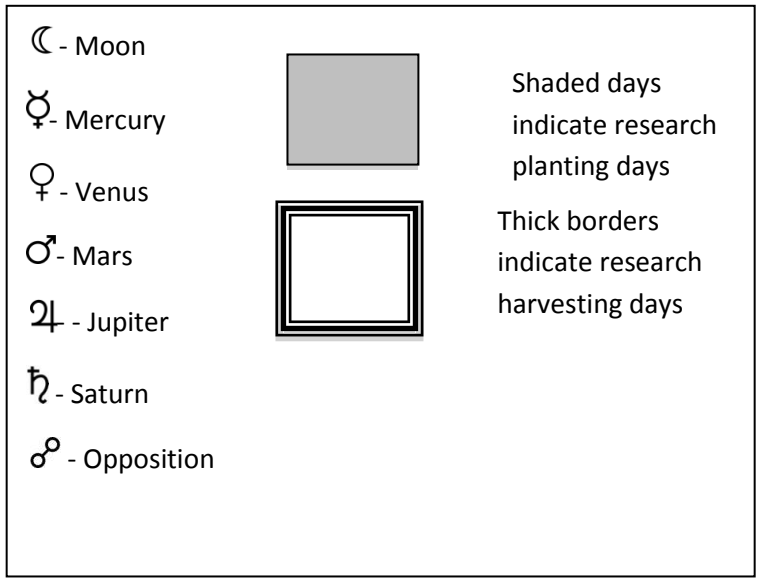
March 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1 New Moon - midnight
2	3	4 ☾☌♂-06:44	5	6 ☾☌♄-05:55	7	8
9	10	11 Apogee- 12:44 pm	12 Best planting days Feb 12-14 ☾☌♀- 06:57	13 ☾☌☿- 23:27	14	15
16 Full Moon- 9:09 am	17	18	19	20	21	22
23	24 ☾☌♃ 07:44	25	26	27 Perigee- 11:38 am	28	29
30 New Moon- 10:45 am	31 ☾☌♂- 08:21					

Notes:

Steiner did not indicate specifically the best times for making, stirring or applying the BD preps 500 and 501. He did, however, speak in lecture one of the *Agricultural Course* of how the outer planets bear the silica forces to the earth, while the inner planets bear the limestone forces to the earth. Thus, outer planetary-lunar oppositions should be considered as the best times to make or spray 501, while inner planetary-lunar oppositions should be considered as the best times to make or spray 500. 501 in particular should be applied during warm periods if at all possible. Data collection sheets follow each month where harvesting and data collection take place. Detailed results from the 2013 calendar can be found starting on page 25 (after December).

Calendar legend:



Happy Gardening and Warmest Regards,

John Bach

The following is a summary of the planting and harvesting dates on the calendar:

April 8th –Plant radishes trial 1a

April 12th - Plant radishes trial 1b

April 13th- Plant radishes trial 1c

April 22nd- Plant radishes trial 1d

April 25th- Plant radishes trial 1e

April 26th- Plant radishes trial 1f

May 6th – Plant lettuce trial 2a

May 10th- Plant lettuce trial 2b

May 11th – Plant lettuce trial 2c

May 13th – Harvest, measure, weigh 1a

May 17th- Harvest, measure, weigh 1b

May 18th-Plant lettuce trial 2d

May 18th-Harvest, measure, weigh 1c

May 25th – Plant lettuce trial 2e

May 26th - Plant lettuce trial 2f

May 27th- Harvest, measure, weigh 1d

May 30th- Harvest, measure, weigh 1e

May 31st- Harvest, measure, weigh 1f

Jun 9th- Plant bush beans trial 3a

June 10th- Plant bush beans trial 3b

June 14th- Plant bush beans trial 3c

June 23rd- Plant bush beans trial 3d

June 24th- Plant bush beans trial 3e

June 25th- Harvest, measure, weigh 2a

June 29th- Harvest, measure, weigh 2b

June 30th- Harvest, measure, weigh 2c

June 30th- Plant bush beans trial 3f

July 7th- Harvest, measure, weigh 2d

July 14th- Harvest, measure, weigh 2e

July 15th- Harvest, measure, weight 2f

August 8th- Harvest, measure, weigh 3a

August 9th- Harvest, measure weigh 3b

August 13th- Harvest, measure, weigh 3c

August 22nd- Harvest, measure, weigh 3d

August 23rd- Harvest, measure, weigh 3e

August 29th- Harvest, measure, weigh 3f

April 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2 ☾☌♄- 14:54	3	4	5
6	7	8 Apogee- 8:00 am Trial 1a- plant radishes (flower/leaf)	9	10	11BEST PLANTING TIMES April 9-11 ☾☌♀- 02:55	12 Trial 1b- plant radishes (fruit/root day)
13 Trial 1c- plant radishes (root)	14 ☾☌☉- 00:01 Lunar Eclipse 21:52 PST	15 Full Moon- 12:42 am No plant time from April 12-15	16	17	18	19
20 ☾☌♃- 17:32	21	22 Perigee- 5:21 pm Trial 1d – plant radishes (no plant)	23	24	25 Trial 1e- plant radishes (flower/leaf)	26 Trial 1f- plant radishes (leaf)
27 ☾☌♂- 00:28	28 New Moon- 23:14	29 ☾☌♄- 20:56	30			

Notes:

Germination Data Sheet

Please use this data sheet to record germination times (in days). Record the germination times of each seed in each of the trials in the column for that trial. Calculate the average for each trial and record at the bottom of each column (add total number of days for each column divided by the number of seeds that germinated).

Trial 1- Radishes Trial 2- Lettuce Trial 3- Bush Beans

Trail →	1a	1b	1c	1d	1e	1f	2a	2b	2c	2d	2e	2f	3a	3b	3c	3d	3e	3f
Seed ▼																		
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
Total Avg →																		

May 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6 Apogee- 03.24 Trial 2a- plant lettuce (flower/leaf)	7	8	9 Best planting dates- May 10-12	10 Trial 2c – plant lettuce (fruit/flower)
11 ☾☌♀- 04:34 Trial 2c- plant lettuce (root day)	12	13 Harvest, measure and weigh 1a	14 Full Moon- 12:16	15	16 ☾☌☿- 00:43	17 Harvest, measure and weigh 1b
18 Harvest, measure and weigh 1c Perigee- 17:00/ Trial 2d- plant lettuce (no plant) /☾☌♃ 06:49	19	20	21	22	23	24 ☾☌♂- 01:07
25 Trial 2e- plant lettuce (leaf/no plant/fruit)	26 Trial 2f- plant lettuce (fruit)	27– Harvest, measure and weigh 1d ☾☌♄- 00:54	28 New Moon- 11:40	29	30 Harvest, measure and weigh 1e	31 Harvest, measure and weigh 1f

Notes:

Trial 1- Data Sheet – Radishes

Plant		Trial 1a- plant length	Trial 1a - weight – root only	Trial 1a – total weight	Trial 1b – plant length	Trial 1b – weight- root only	Trial 1b- total weight	Trial 1c- plant length	Trial 1c- weight- root only	Trial 1c- total weight	Trial 1d- plant length	Trial 1d- weight- root only	Trial 1d- total weight	Trial 1e- plant length	Trial 1e- weight- root only	Trial 1e- total weight	Trial 1f- plant length	Trial 1f- weight- root only	Trial 1f- total weight
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
avg																			

Notes:

E-mail results to:
jbbach1@yahoo.ca

June

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 Apogee- 21:19	3	4	5	6	7
8 Best planting days- June 8-10	9 Trial 3a- Plant beans (root)	10 Trial 3b- Plant beans (flower) ☾☌☿- 05:49	11	12 Full Moon 21:11	13 ☾☌☿- 12:56	14 Perigee- 20:33 Trial 3c- plant beans (no plant) ☾☌♃-23:35
15	16	17	18	19	20 ☾☌♂- 16:25	21
22	23 Trial 3d- plant beans (fruit) ☾☌♄- 03:59	24 Trial 3e- plant beans (root)	25 Harvest, measure and weigh Lettuce 2a	26	27 New Moon 01:09	28
29 Harvest, measure and weigh lettuce 2b	30 Harvest, measure and weigh lettuce 2c Apogee- 12:14 Trial 3f- plant beans (flower)					

Notes:

Trial 2- Data Sheet – May 2014 (Lettuce)

Plant		Trial 2a-total length	Trial 2a length – leaves only	Trial 2a – total weight	Trial 2b – total length	Trial 2b length – leaves only	Trial 2b – total weight	Trial 2c- total length	Trial 2c- length- leaves only	Trial 2c- total weight	Trial 2d- total length	Trial 2d- length- leaves only	Trial 2d- total weight	Trial 2e- total length	Trial 2e- length- leaves only	Trial 2e- total weight	Trial 2f- total length	Trial 2f- length – leaves only	Trial 2f- total weight
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
avg																			

Notes:

E-mail results to:
jbbach1@yahoo.ca

July

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
6	7 Harvest, measure and weigh lettuce 2d	8 Best Planting Days- July 8-10	9	10 ☾☌♀ - 04:30 ☾☌☿ - 17:19	11	12 Full Moon 04:25 ☾☌♃ - 18:56
13 Perigee- 1:30 am	14 Harvest, measure and weigh lettuce 2e	15 Harvest, measure and weigh lettuce 2f	16	17	18 ☾☌♂ - 19:18	19
20 ☾☌♄ - 20:21	21	22	23	24	25	26 New Moon 14:42
27 Apogee- 8:39 pm	28	29	30	31		

Notes:

August

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	5	6 Best planting days- August 6-8	7	8 Harvest, measure and weigh beans from 3a	9 Harvest, measure and weigh beans from 3b ☾☌♀- 01:09 ☾☌♃- 15:24
10 Full Moon 11:09 Perigee- 10:46 am (Closest of Year) ☾☌☿- 15:12	11	12	13 Harvest, measure and weigh beans from 3c	14	15	16 ☾☌♂- 06:28 ☾☌♄- 15:26
17	18	19	20	21	22 Harvest, measure and weigh bean from 3d	23 Harvest, measure and weigh beans from 3e Apogee- 10:41
24	25 New Moon 07:13	26	27	28	29 Harvest, measure and weigh beans from 3f	30
31						

Notes:

Trial 3- Data Sheet – Bush Beans

Plant		Trial 3a- # of pods/plant	Trial 3a- total pod weight	Trial 3b- # of pods/plant	Trial 3b - total pod weight	Trial 3c-# of pods/plant	Trial 3c total pod weight	Trial 3d-# of pods/plant	Trial 3d total pod weight	Trial 3e-# of pods/plant	Trial 3e total pod weight	Trial 3f-# of pods/plant	Trial 3f total pod weight
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
avg													

Notes:

E-mail results to:
jbbach1@yahoo.ca

September

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4 Best Planting days- Sept 4-6	5	6 ☾☌♃ - 11:11
7 Perigee- 8:33 pm ☾☌♀ - 21:38	8 Full Moon 18:38	9	10 ☾☌☿ - 12:26	11	12	13 ☾☌♄ - 03:24 ☾☌♂ - 23:53
14	15	16	17	18	19	20 Apogee- 7:26 am
21	22	23 New Moon 23:14	24	25	26	27
28	29	30				

Notes:

October

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2 Best Planting Days- Oct 2-4	3	4 ☾☌♃ - 04:22
5	6 DO NOT PLANT	7 ☾☌♇ 19:58	8 Full Moon 03:51 Lunar Eclipse	9 ☾☌☿- 06:08	10 ☾☌♄ - 17:49	11
12 ☾☌♂- 22:12	13	14	15	16	17	18
19	20	21	22	23 New Moon 13:57	24	25
26	27	28	29	30	31	

Notes:

November

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2 Best Planting Days- 2-4	3	4	5 ☾☌☿ - 05:25	6 Full Moon 14:23 ☾☌♀ - 20:31	7 ☾☌♄ - 08:17	8
9	10 ☾☌♂ - 11:13	11	12	13	14	15
16	17	18	19	20	21	22 New Moon 04:32
23	24	25	26	27	28 ☾☌♃ - 01:16	29
30						

Notes:

December

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2 Best planting days Dec 2-4	3	4 ☾☌♄ - 22:45	5	6 Full Moon 04:27 ☾☌☿ - 02:16
7 ☾☌♀ - 01:52	8	9	10 ☾☌♂ - 03:38	11	12	13
14	15	16	17	18	19	20
21 New Moon 17:36	22	23	24	25 ☾☌♃ - 07:11	26	27
28	29	30	31			

Notes:

Results from the 2013 Bach Biodynamic Planting and Research Calendar

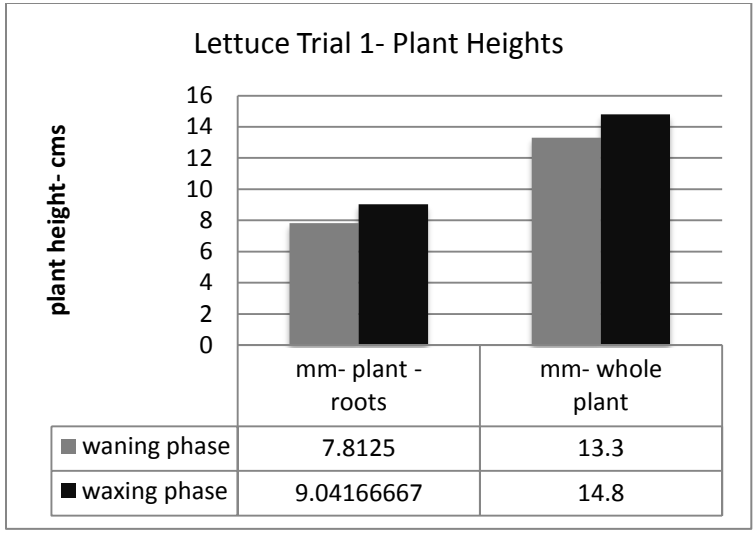
The inaugural Bach Biodynamic Planting and Research Calendar consisted of a series of planting trials that spanned the months of January through June 2013. This year's trials had the intention of comparing two different approaches to sowing using cosmic rhythms. The first of these rhythms is the synodic lunar rhythm, where Rudolf Steiner indicated in *The Agricultural Course* that the best times for sowing seeds was two days before a full moon. The second approach was that developed by Maria Thun, where the moon's passage through the constellations is used to plant various crops (root, flower, fruit, leaf). A more complete discussion of these approaches can be found in my essay *Rudolf Steiner's Indications Regarding Cosmic Influences Upon the Growth of Plants* available as a download from my website www.bachbiodynamics.com. The trials themselves presented difficulties, and as a result, some of these trials must be considered as unsuccessful. In trial one, for example, the lettuce germinated, but soon died, as there was not enough light in the windowsill to stop the plants from running, collapsing, and then dying. This was the experience for most of the small group of us conducting the trials in Vancouver who used only natural light. Artificial light from one of the researchers here in Vancouver was used, and the data from this trial is good, but not ideal, as it is only one set. In subsequent indoor trials, most of us added a grow light to help the plants along while they were indoors. Other obstacles arose in the later plant-out trials, where plants were started indoors, and then transplanted outside after 30 days. These problems were in the form of slug attacks on plants. The intention of the indoor portion of the trials was to eliminate as many variables as possible (temperature and rainfall fluctuations) so as to provide an environment where lunar influences could be studied without possible confounding factors.

Planting trials 1 and 6 only have one set of data, meaning only one of the participants was able to grow a full set of plants for both parts of the trial. Trials 2,3,4 were carried to completion by a larger number of participants, and provide a broader range of data. Trial 5, the second of the plant-out trials, was not a success for me or any of our small Vancouver research group, because of a heavy slug infestation, which destroyed many of the transplants. My plants were almost completely wiped out in a single evening. Slugs are a large gardening problem on the damp West Coast. A discussion of how to deal with this problem will occur at the end of this paper. Despite the difficulties that were encountered, meaningful data was collected. The data from the various trials discussed has been graphed, to show comparisons between synodic (waxing-waning phase) data. The waning phase data was always planted on the corresponding trigon day. In trial 2 discussed below, for example, the radishes were planted on a root day for the waning phase, and on a non-root day for the waxing phase. In this way, the synodic and trigon lunar influences can be compared to see which would have the strongest influence. I believe that the data below shows that the strongest influence affecting plant growth is the synodic rhythm, but the anomalistic cycle, where the moon comes closest (perigee) and furthest (apogee) to the earth may also have been a factor, but more research is needed to prove this. The anomalistic month spans about 27.6 days. There were also 2 lunar eclipses that occurred close to the waxing planting days of trials 4 and 5. I believe that these also had a strong negative influence on the germination and growth of plants.

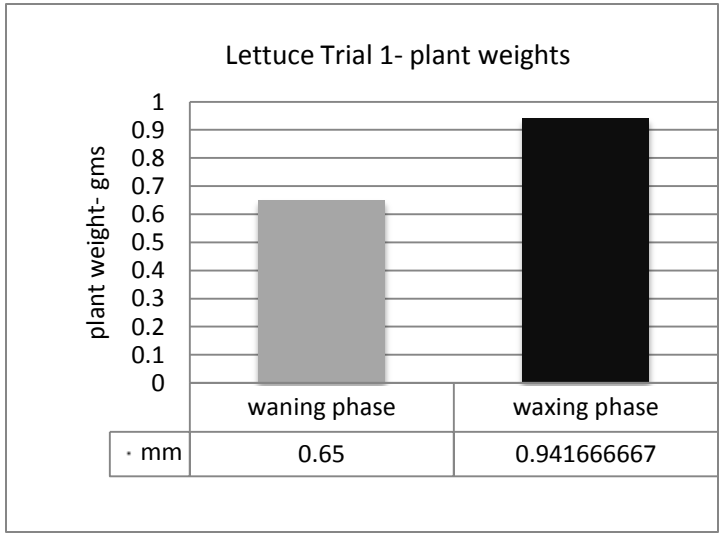
that these also had a strong negative influence on the germination and growth of plants. More details of these influences will be given in the discussion of data for each of the trials. I would also like to say that the data given here is not and should not be considered as complete or comprehensive in any way. It is not. Any conclusions that I have drawn must still be considered as a more directed and supported hypothesis that will be carried forward in the 2014 calendar. The design and execution of the trials in this inaugural year of the calendar presented problems, which will be discussed for each of the trials here given. These problems however, provided valuable information for the design and execution of future trials, with the goal that over a longer period of time (several years at a minimum), a clearer picture of the rhythms here studied will arise. Before I begin discussing data, I would like to thank Ali Roth, Michael Roboz, and Marianne Moser, all from Vancouver, and Herzliche Grüsse, Conradin Obrecht and Benno Otto from the Goetheanum for their participation in this year's calendar. I hope that they will continue to participate in the future. Their hard work and diligence has been commendable and has added greatly to the scope of this year's research. The initials of each of the participants has been used for the research sets of the Vancouver group, while 'Got' is used for research sets from the Goetheanum.

<u>Trial 1 (lettuce)</u>

Waning sowing time: Jan 9th 2013 (leaf day)
Waxing sowing time: Jan 24th 2013 (flower day)
Waning phase germination: 9/12 (75%)
Waxing phase germination: 12/12 (100%)
Average germination time waning phase: 7.3 days
Average germination time waxing phase: 4.6 days
Combined size of all data sets: 21plants



This first trial, although small, shows a pattern that will be generally consistent throughout- that of the waxing phase providing larger and heavier plants. The weight of the lettuce plants in the waxing phase (1b) of the first trial were, on average .29 grams, or

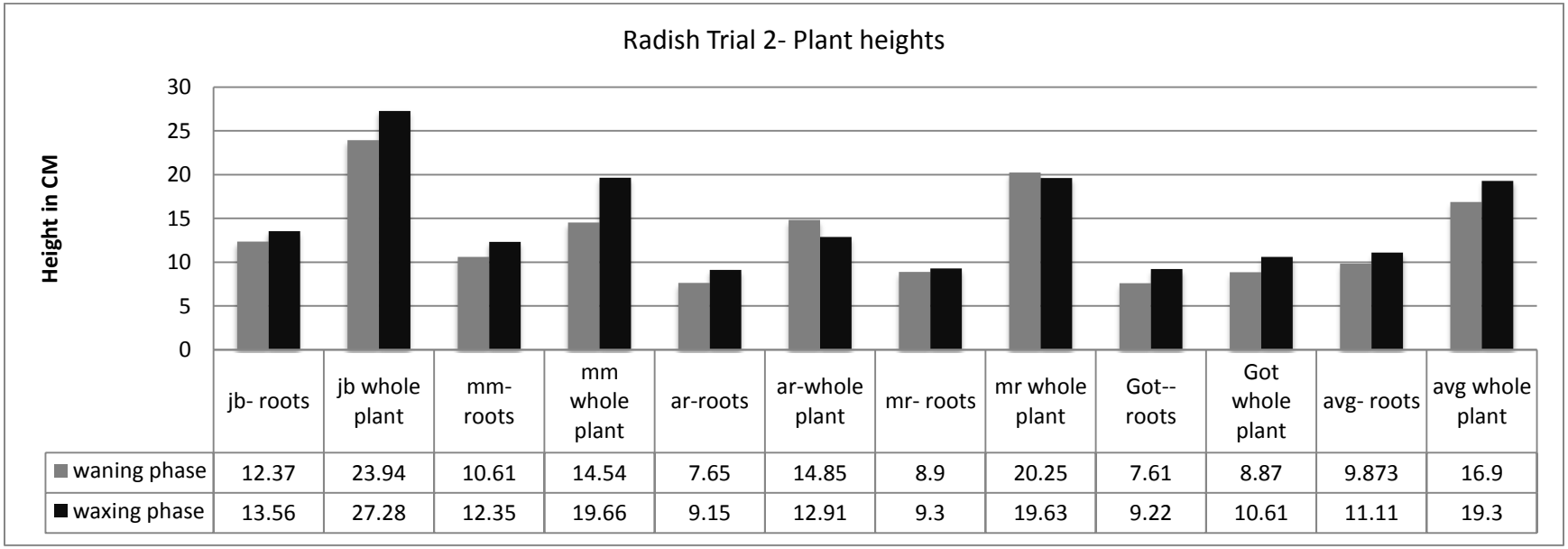


about 45% heavier that those in the waning phase (1a) of the trial.

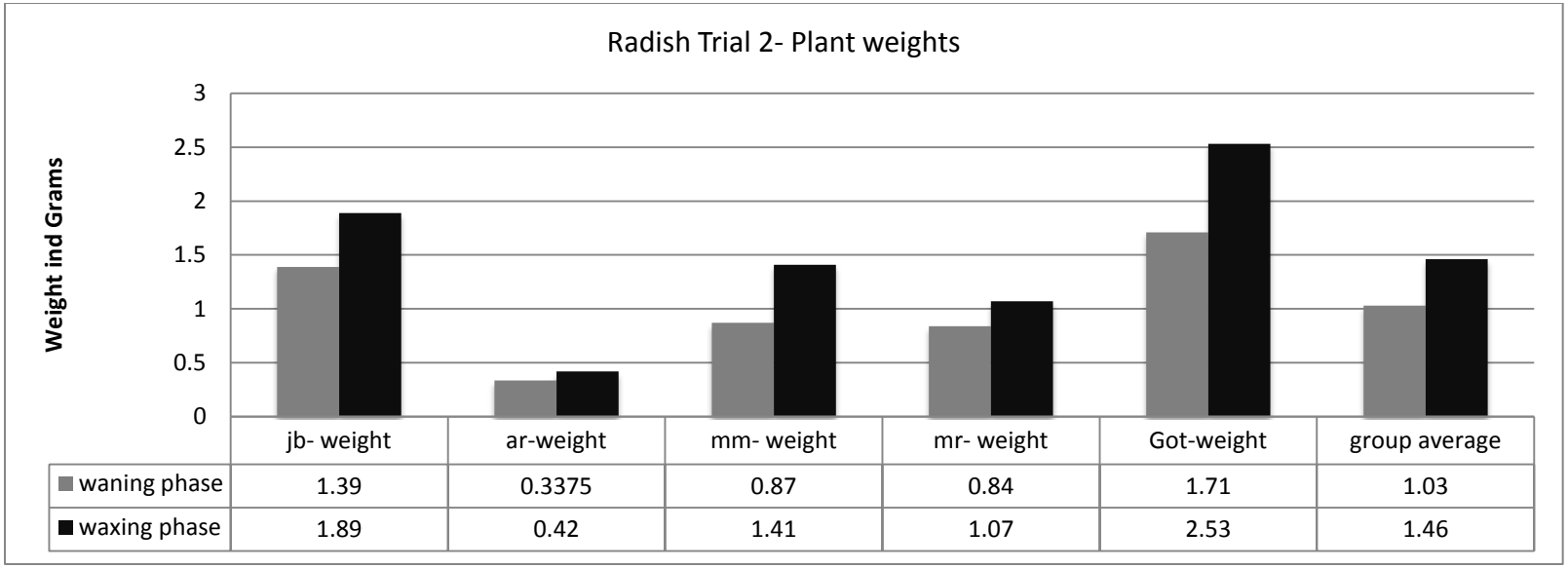
The heights of the plants in trial one were also larger in the waxing phase than the waning phase. The waxing phase plants measuring the above ground portion only were 1.23 cm higher (15%) and for the whole plant 1.5 cm (11%) higher.
Perigee occurred one day after (Jan10th) the planting day for trial 1a. The work done by Harmut Spiess showed that perigee had a favourable influence on the growth of plants. If this is the case, as perigee moves towards the waxing phase, the yields of the plants in the waxing phase should increase in relation to the waning phase.

Trial 2 (radishes)
Waning sowing time: Feb 8th 2013 (root day)
Waxing sowing time: Feb 23rd 2013 (leaf day)
Waning phase germination: 52/60 (87%)
Waxing phase germination: 54/60 (90%)
Average germination time waning phase: 6.86 days
Average germination time waxing phase: 5.07 days
Combined size of all data sets: 106 plants

In this trial, germination for both phases of the trial was very close (from five sets). Germination times, however, were somewhat lower for waxing phase plants (1.79 days), but this data is only from four sets (not all five sets). The average height for the whole plant was 2.4 cm higher for the waxing phase, while less roots plants were 1.24 cm longer for the waxing phase. Plants were on average .57 grams heavier for the waxing phase.



	jb- roots	jb whole plant	mm-roots	mm whole plant	ar-roots	ar-whole plant	mr- roots	mr whole plant	Got--roots	Got whole plant	avg- roots	avg whole plant
waning phase	12.37	23.94	10.61	14.54	7.65	14.85	8.9	20.25	7.61	8.87	9.873	16.9
waxing phase	13.56	27.28	12.35	19.66	9.15	12.91	9.3	19.63	9.22	10.61	11.11	19.3



	jb- weight	ar-weight	mm- weight	mr- weight	Got-weight	group average
waning phase	1.39	0.3375	0.87	0.84	1.71	1.03
waxing phase	1.89	0.42	1.41	1.07	2.53	1.46

Perigee during this phase occurred one day before the waning planting date, while apogee occurred four days before the waxing phase planting dates. Perigee moved in retrograde towards the waxing phase during the spring of 2013, and reached its closest waxing point in June, where perigee occurred on the full moon that month.

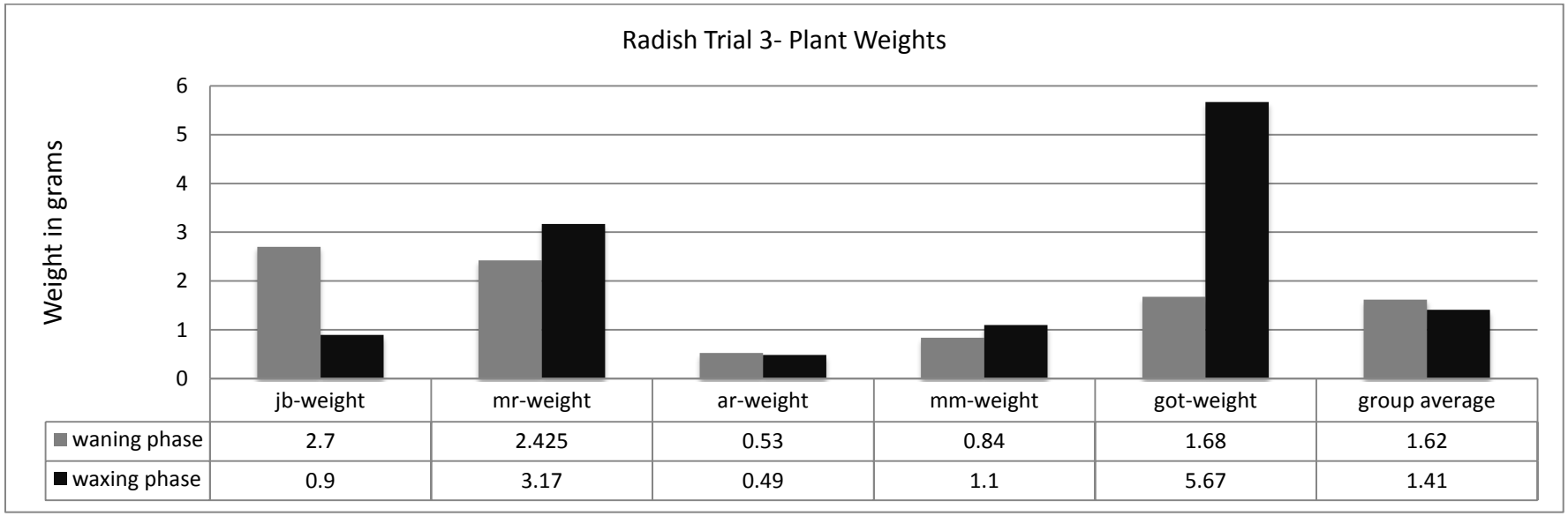
Summary of Trial 2: The waxing phase plants were larger and heavier than the waxing phase plants, and germinated more quickly. The plants were, on average 14% higher and 42% heavier in the waxing phase of trial 2.

Trial 3 (radishes)

Waning planting date: March 8th 2013 (root day)
Waxing planting date: March 25th 2013 (fruit day)
Waning phase germination: 55/60 (92%)
Waxing phase germination: 56/60 (93%)
Average germination time waning phase: 4.43 days
Average germination time waxing phase: 4.24 days
Combined size of all data sets: 111 plants

Data for the second set was very closely matched. Germination was slightly quicker for the waxing phase (only .2 days, instead of the 1.4 days of trial two), while plant roots were longer for the waxing phase (almost 2 cm), and plant heights were longer for the waning phase (almost 3.5 cm). Plant weight was slightly higher (by an average of .21 grams). There is one statistical aberration in the data: it is my (jb) data set. The waning weights in my set were almost 3 times higher than for the waxing set. I believe that this came about from a lack of water in this phase of my trial. I had planted many plants for my garden, which shared the same space in my small solarium. With these hundreds of plants, the research plants were not getting as much water as the plants from the waning trial. I noticed they were dry when I removed them from their cells. I have to be more careful of this in the future, and water more accurately. If I take my data out, the average weights for the waning and waxing phase are as follows:

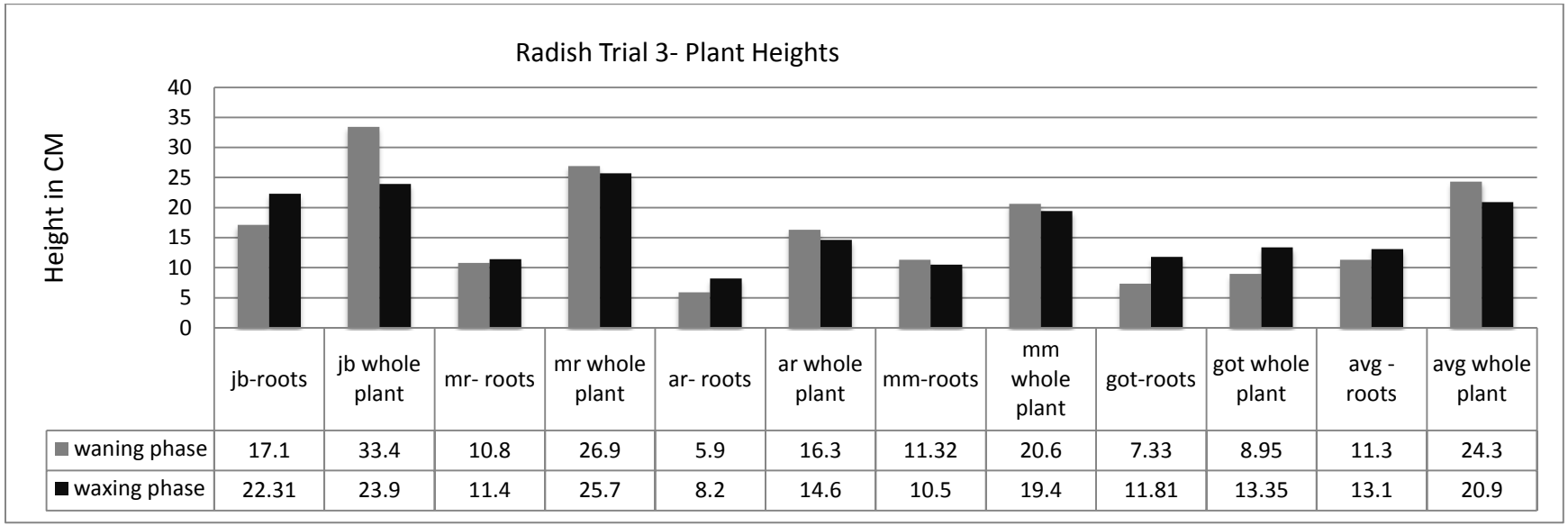
Waning phase: 1.37 grams
Waxing phase: 2.61 grams



	jb-weight	mr-weight	ar-weight	mm-weight	got-weight	group average
waning phase	2.7	2.425	0.53	0.84	1.68	1.62
waxing phase	0.9	3.17	0.49	1.1	5.67	1.41

The waxing phase plants of trial 2 were 41% heavier than the waning phase, and, less my data, the waxing phase plants were 25% heavier in trial 3. It should also be noted, however, that the AR data set also had slightly higher weights for the waning phase. In particular, the plant heights for this trial are longer for the waning phase, even with my data set removed. Perigee for this third data set was three days before the waning planting date,

which may have been close to an ideal, but more research will be needed to get a clearer picture of this. It may also be that the favourable trigon day (root day) benefitted the waning plants.



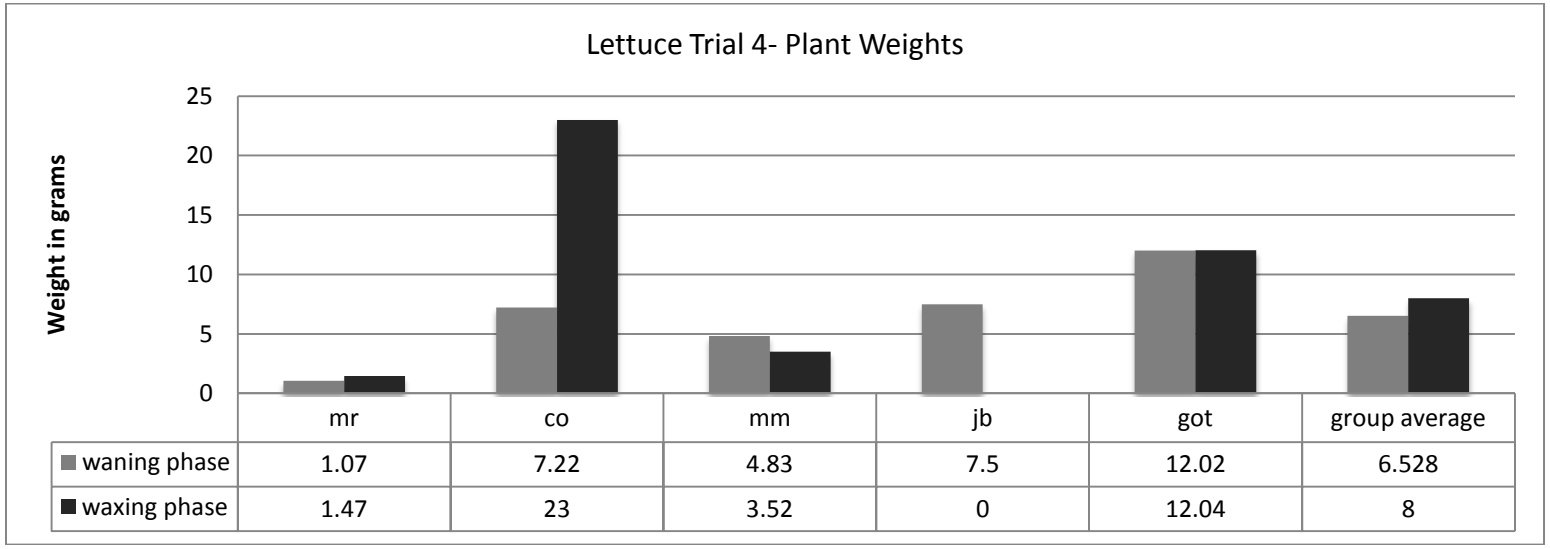
	jb-roots	jb whole plant	mr- roots	mr whole plant	ar- roots	ar whole plant	mm-roots	mm whole plant	got-roots	got whole plant	avg - roots	avg whole plant
waning phase	17.1	33.4	10.8	26.9	5.9	16.3	11.32	20.6	7.33	8.95	11.3	24.3
waxing phase	22.31	23.9	11.4	25.7	8.2	14.6	10.5	19.4	11.81	13.35	13.1	20.9

Summary of Trial 3: The data in this set is much more ambiguous, and it is hard to draw clear conclusions. Mistakes may have been made.

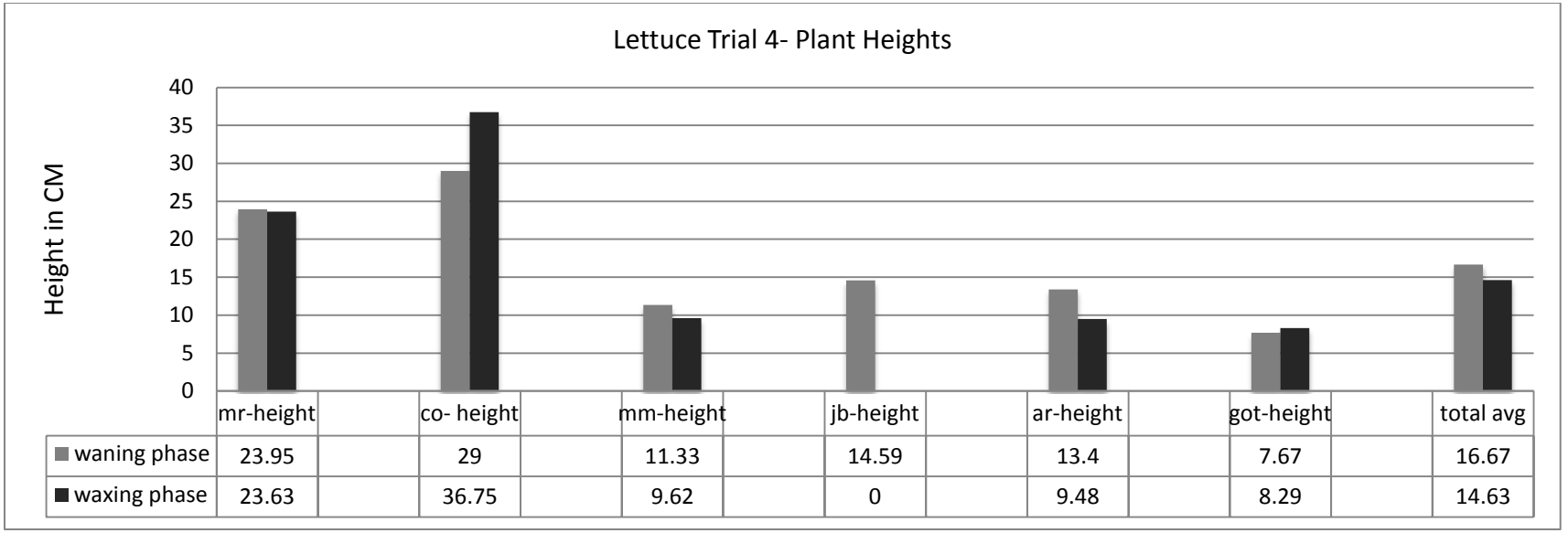
Trial 4 (lettuce)

Waning planting date: April 8th (root day)
Waxing planting date: April 23rd (fruit day)
Waning phase germination: 46/60 (77%)
Waxing phase germination: 49/60 (82%)
Average germination time waning phase: 5.9 days
Average germination time waxing phase: 4.8 days
Combined size of all data sets: 95 plants

This trial presented some inconsistent data, part of which may be explained by the lunar eclipse that occurred on April 25th. Also, the trial weights of MR were taken after 30 days, not after the maturity of the plants, as explained in the calendar. I have included them here, as I believe they are of use. There are two Goetheanum data sets here, CO and Got. My data set (JB) presented the first anomaly I would like to point out. I had terrible waxing phase germination (1/12), and feel that this may have been because I planted in the evening (I planted in the morning for all of the other trials). I do not think that the evening planting in itself caused the poor germination, but that the impending lunar eclipse, which was, at the time I planted (8 pm PST), only 41 hours away may have had a very negative impact on germination. The other participants here in Vancouver all planted in the morning, which gave the plants a longer period to germinate (somewhere in the area of 12 hours), and this may have given the seeds enough time not to be so adversely affected by the eclipse. The PST time zone is one of the most westerly time zones on earth, so the eclipse here happened closer in relation to the planting date of April 23rd. The time of the eclipse in Vancouver was 12:57 pm in the afternoon on April 25th, while in Switzerland, the eclipse occurred at 9:57 pm in the evening (and was therefore visible, where in Vancouver it was not). This, assuming the Goetheanum planting occurred in the morning, would have given the seeds an extra 9 hours to germinate, making their planting time somewhere around 60-65 hours before the lunar eclipse, almost a full day more than my evening plantings. From this, I hypothesise that there is a time before (and I would also assume after) when planting near a lunar eclipse should not occur. From this very limited and hypothetical example, I would place that no-sowing bubble somewhere in the area of 48 hours. I will study this in greater detail in later issues of the calendar. I would also like to point out that the Goetheanum planting weights are anomalistic; with the CO waxing numbers almost double the weights of the other Got data set.



	mr	co	mm	jb	got	group average
waning phase	1.07	7.22	4.83	7.5	12.02	6.528
waxing phase	1.47	23	3.52	0	12.04	8



	mr-height	co- height	mm-height	jb-height	ar-height	got-height	total avg
waning phase	23.95	29	11.33	14.59	13.4	7.67	16.67
waxing phase	23.63	36.75	9.62	0	9.48	8.29	14.63

The averages from the Vancouver group are mixed. MR was heavier during the waxing phase (37%), while MM was heavier during the waning phase (37%). The data from the Goetheanum was also mixed, with CO having much higher plant weights during the waxing phase (218%) while the weights for the GOT set were almost exactly the same. Interestingly, the plant heights for most of the data here are closer than the plant weights. For example, MR's plant height was only 1.4% higher than the waxing phase, MM only 18% for the waning phase, and CO only 27% higher for the waxing phase.

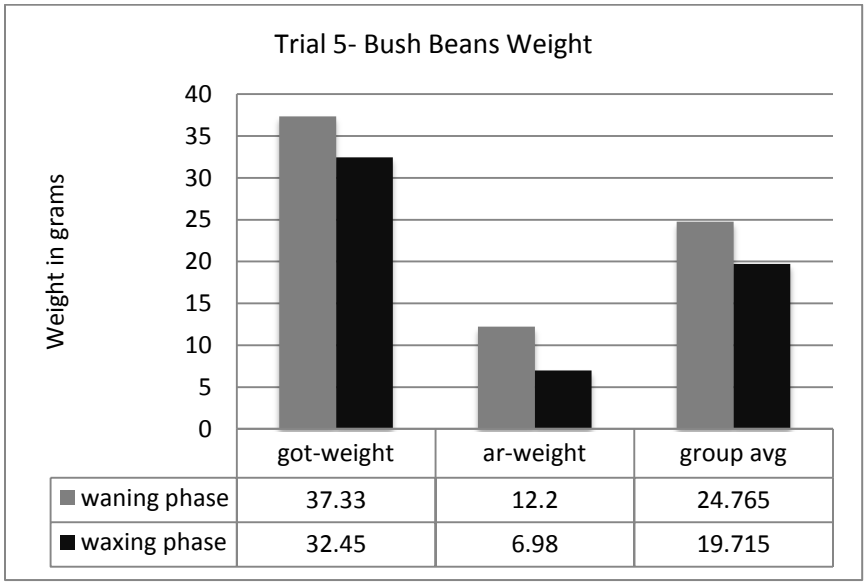
Summary of Trial 4: The data here tentatively suggests a lunar eclipse may have had a negative effect on plant germination and development. Rudolf Steiner spoke in the *Agricultural Course* of how the forces of the Sun are transformed and reflected back to the Earth: "It is the rays of the Sun which are thus *reflected*, but of course the Moon permeates them with its own forces. They come to the Earth as Lunar forces…" (p. 109)[2]. It follows that if the rays of the sun are blocked from reaching the moon (by the earth in the case of a lunar eclipse), that the moon would not be able to transform these forces and send them to the earth as the forces of germination and growth.

[2] Steiner, R. (2004). Agricultural Course, The Birth of the Biodynamic Method. Eight Lectures given in Koberwitz, Silesia, between 7 and 16 June 1924. Rudolf Steiner press.

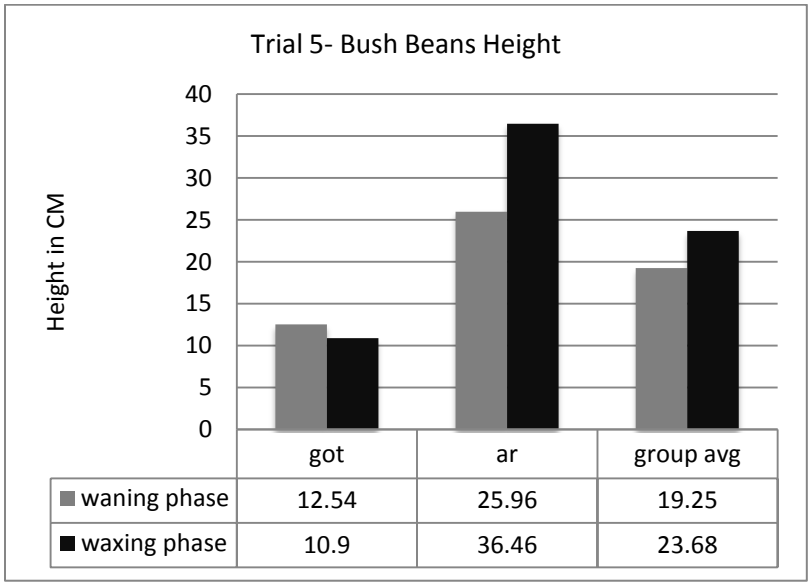
Trial 5 (bush beans)

Waning planting date: May 6th (fruit day)
Waxing planting date: May 22nd (root day)
Waning phase germination: 24/24 (100%)
Waxing phase germination: 23/24 (96%)
Average germination time waning phase: 7.8 days
Average germination time waxing phase: 8.91 days
Combined size of all data sets: 47 plants

Trial 5: Only two useable data sets were obtained from trial 5. This was from a trial done by the Goetheanum and one done in Vancouver by AR. I can say that I personally had better waning phase germination 11/12 (4.1 days germination) versus waxing phase 4/12 (4 days germination), but the plants when planted out were almost all badly damaged or destroyed by slugs, making the data from the set unusable. This was also the experience of others in the Vancouver group. Both of the weight averages for this trial were higher for the waning phase, the Goetheanum's being 15% heavier during the waning phase, and AR's being 75% heavier. These averages are the total weight of pods harvested per plant. An anomaly occurred with AR's plant heights, which were strangely higher for the waxing phase, even though the yields were heavier for the waning phase.



	got-weight	ar-weight	group avg
waning phase	37.33	12.2	24.765
waxing phase	32.45	6.98	19.715



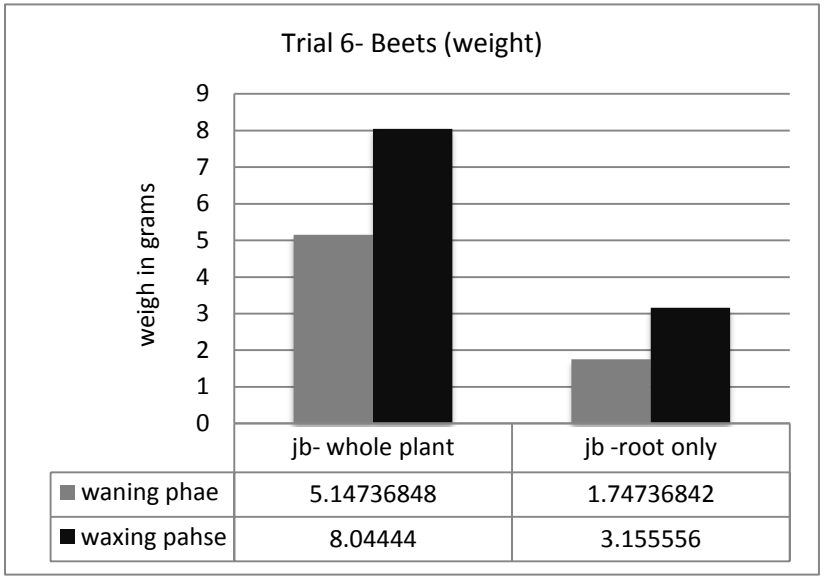
	got	ar	group avg
waning phase	12.54	25.96	19.25
waxing phase	10.9	36.46	23.68

Summary of Trial 5: The lunar eclipse may have prevented waxing seeds from germinating in the data set I conducted. The Goetheanum data set germinated well, but the waxing plants were not as tall and yielded less than the waning set. The lunar eclipse would have, as stated above, been nearer to my morning planting time in Vancouver, and could explain the lower germination rates. The Goetheanum trial, again assuming a morning planting, would have been further (somewhere around 9 hours) away from the eclipse, giving the seeds more time to germinate properly, but having said this, AR had good germination for both sets. I hypothesis that the eclipse affected the overall growth of the plants, giving the smaller yields of the waxing phase, but the data is ambiguous. This will be researched more fully around future eclipses.

Trial 6- Beets

Waning planting date: June 6th (root day)
Waxing planting date: June 21st (flower/leaf day)
Waning phase germination: N/A
Waxing phase germination: N/A
Average germination time waning phase: N/A
Average germination time waxing phase: N/A
Combined size of all data sets: 37 plants

The only data set available for this trial was mine. Others in the trial were on holidays and had commitments that did not allow them to see this trial through to its conclusion. The germination data is not available for this trial, as I learned that each beet seed is not a single seed, but rather cluster of several seeds. Because of this, I had 18 plants in the waxing phase and 19 plants in the waning phase, from 12 seeds planted in each trial. I do not know how many seeds were in each of the seedpods, and therefore cannot provide accurate germination numbers. I also found that the seeds from each pod germinated at different rates, and got confused as plants kept coming up where I thought I had just planted one seed. Because of this, I do not feel I could provide accurate germination data as to the length of time for each seed to germinate. Having said this, I did weigh the whole plants and then the roots from each of the sets.



For the waxing phase, the whole plant was, on average 2.9 grams, or 56% heavier than for the waning phase, while the roots were 1.4 grams, or 81% heavier, also for the waxing phase. This also coincides with Spiess' finding that perigee had a positive effect on the growth of many plants, as perigee in this phase occurred on the day as the full moon. There was no lunar eclipse during this trial to impede the full force of the waxing moon at perigee for this trial. The difference in plant weights in this trial was the largest found of all the trials, further supporting the hypothesis that perigee, as well

as the waxing moon are the most significant factors affecting the growth of plants.

Summary of trial 6: This trial supports the hypothesis that the most important cosmic factors affecting growth are the synodic and anomalistic lunar cycles, but because it was only one small set of data, cannot be considered as anything more than an indication for future research.

Conclusions and Future Directions

This year's inaugural calendar provided enough data to further pursue the hypothesis that the waxing phase is the best time to plant (specifically two days before a full moon), but much more work needs to be done before this can definitively established. Apogee and perigee, as well as lunar eclipses also seem to have a pronounced affect on the growth of plants, and this will again be studied through research trials in future editions of the calendar. Trigons, at this point, do not seem to significantly affect the growth of plants, but this too is not yet definitive, and will be the subject of further research. For example, planting trial three presented ambiguous data, which may have been the result of perigee being at a very favourable time in relation to the waning cycle, or of the favourable trigon for that planting time.

Lessons learned from this year's calendar will also guide the planting scheme for the 2014 calendar. Winter plantings will be abandoned, as the light at this time of year is not strong enough to support good growth without adding artificial light. Measures to combat garden pests, in particular slugs, have to be in place. I constructed some raised beds with concrete walls and a slug moat, which should help deter slugs. Daily evening slug patrols will also be conducted. Beets will not be used for trials as they do not give reliable germination data, due to the fact that one 'seed' is not actually a seed but a conglomeration of seeds, varying in number. Next year's calendar will consist of plantings, all outdoor, probably in the months of April, May and June although more may be added if there are interesting events happening. Planting will also be for two consecutive days, again around new and full moon dates, and again studying the corresponding trigon. Apogee and perigee plantings will also occur during these months. Gathering meaningful data for apogee and perigee will take several years, as the synodic cycle will also affect data. For example, to ascertain the affect of perigee, data should be gathered for perigee in both the waning and waxing aspects of the synodic cycle, and this can only be done over several years. I also hope that more people will participate in next year's calendar, and that the Goetheanum will again also be able to take part. The more diverse the sources of data, the more reliable will be the conclusions drawn from it. Any comments and thoughts are appreciated and can be sent to me at jbbach1@yahoo.ca.
Thank-you,

John Bach