

Using Bulbils to Establish Garlic

Garlic is normally started by planting cloves. As a typical head of garlic only contains from 5-10 usable cloves the cost of holding back 10-20% of the crop to use as seed can be substantial. Costs are even higher if the grower opts to buy seed. Another concern with using cloves to establish the garlic crop is the potential for the cloves or the soil adhering to the cloves to introduce diseases such as Fusarium basal rot or garlic cyst nematodes. Hardneck (rocamboles) type garlic produces scapes or flower stalks that yield 10-200 small bulbils (bulbils) which can be used as planting material. Using bulbils to establish a garlic crop has several potential advantages;

- a) It saves on the substantial expense of holding back 10-20% of your bulbs to use as seed
- b) As bulbils grow on stalks they should be less likely to harbor soil-borne diseases or pests
- c) Bulbils are easier to harvest, store and prepare for use as seed than garlic bulbs
- d) Mechanical planting of garlic cloves requires specialized equipment, whereas bulbils can be planted using slightly modified corn seeding equipment.

There are however some potential limitations associated with using bulbils to establish the garlic crop;

- a) Growth of the scape and associated bulbils has the potential to compete with the bulb for resources, leading to a reduction in bulb size at harvest
- b) Bulbils tend to be much smaller than a standard clove. As the early season vigor of a garlic plant is directly correlated with the size of the clove or bulbil used – the small size of the bulbils puts the young garlic plants at a competitive disadvantage against weeds etc.
- c) The small size of the bulbils means that it typically takes 2 growing seasons to produce a full sized bulb. In the first season, a crop established from bulbils typically yields a round pea to marble sized single bulb very similar in appearance to a pickling onion. If these rounds are replanted they will form the standard sized bulb with the normal number of cloves in the 2nd year.



Garlic scape, flower and bulbils



The objective of this study was to address a number of the questions that arise when Saskatchewan growers consider using bulbils to establish a garlic crop;

- a) What is the impact on yield and bulb size of not removing the scapes but instead letting the bulbils form and mature?
- b) How many usable bulbils are formed per scape? Does that number vary amongst cultivars? Is that number at all related to the number of cloves found in each bulb?

2013 Garlic Crop from Bulbils

In late fall of 2012 mature scapes were harvested from the popular hardneck garlic cv. Music. The bulbils were weighed and then planted using a standard push planter equipped with the disks recommended for planting large types of corn. The bulbils were planted 5 cm deep with 10 cm between bulbils within the row, in rows spaced 30 cm apart. Two weeks after planting the plot was covered with 15 cm of straw and a sheet of woven field cover. Use of the mulch + field cover coupled with the exceptional amounts of snow received over the winter of 2012/2013 provided excellent over-winter protection for the trial. The straw+cover was removed as soon as the snow melted (early May) in 2013. The crop established from bulbils emerged about 10 days later than the crop established using cloves. About 70% of the bulbils planted survived the winter – while 67% of the fall planted cloves survived to produce plants. The crop from bulbils grew more slowly than the crop established from cloves. This slow growth made weed control difficult. The crop established from bulbils required at least twice as much hand weeding as the crop grown from cloves. By early July the plants established from bulbils had begun to dieback and they were ready for harvest by mid-July. By contrast, plants established from cloves continued to grow until mid-August. On average the single round bulbs produced when bulbils were planted weighed 3.7g. As the average weight of the bulbils planted was 0.22 g this means the yield multiplier for the bulbil crop was 16 fold ie; for every 1g of bulbils planted 16g of bulbs were produced. By comparison, the yield multiplier for the crop established from cloves was only 6 fold (60g avg bulb wt from 10g avg clove = 6 fold multiplier).

In the fall of 2013 the single round bulbs produced from the bulbils planted in 2012 were replanted. In 2014 their performance will be compared to cloves planted at the same time. It is noteworthy that the bulbs produced by planting bulbils were still substantially smaller than the average clove planted. This may again influence the relative productivity of the garlic in 2014.

This study indicated that;

- a) It is easy to establish a garlic crop from bulbils as they are well suited to mechanical planting.
- b) Over winter survival of crops planted from bulbils was similar to when cloves were used
- c) The plants established from bulbils were smaller and more sensitive to weed competition than plants grown from cloves
- d) Growing from bulbils had a higher overall productivity than using cloves, but the resulting bulbs were still quite small.

Bulbil Production

Nine cultivars of hardneck garlic were planted in the fall of 2012 and maintained as outlined above. When scapes began to form, they were removed as recommended on 75% of the plants, but were allowed to mature on the remaining 25% of the plants in each row. Once the crop matured, the bulbs and scapes were weighed and the number of bulbils per head was counted.

Averaged over the cultivars removing the scapes resulted in a 10% increase in the average bulb size. However, the impact of scape removal on bulb size varied greatly from cultivar to cultivar. While the total weight of bulbils produced by each plant was quite similar across the cultivars (average of 9 g/plant) the number of bulbils per head varied from an average of 3/head for Salt Spring Select to as many as 220 per head for Persian Star. Similarly, there was a huge range in the average weight of each bulbil produced by the various cultivars tested (0.05g to 2.0 g). For the cultivars tested there was no correlation between the number of bulbils produced per head and the number of cloves in each bulb.

This study indicated that;

- a) Leaving the scapes intact reduced the size of the bulbs. However, if the bulbils were used for as planting material, the total amounts of usable material per plant (bulb+bulbils) was always increased by allowing the plants to produce bulbils.
- b) The cultivars tested showed a huge range in the number and size of bulbils produced per flower head.
- c) As plant vigor of garlic is closely related to the size of the bulblet or clove used to establish the crop, there are some obvious concerns regarding the growth potential of the cultivars that produce extremely small bulbils.

Cultivar	Bulb Weight (g)		Bulbils		Total Weight (g)	Cloves per bulb
	Scape Removed	Scape Intact	# per head	Avg Wt (g)	Bulb+bulbils	
German Red	71	90	11	1.57	101	11
Korean Purple	54	50	7	1.43	60	6
Music	59	56	64	0.22	70	5
Persian Star	48	45	220	0.05	56	6
Russian Red -1	54	42	67	0.12	50	8
Russian Red -2	47	19	50	0.20	29	6
Salt Spring Select	42	45	3	2.00	51	10
Spanish Red	58	44	8	1.00	52	6
Yugoslavian	67	50	85	0.07	56	8
Average	56	49	57	0.74	58	7