

- **Good yield potential**
- **Don't forget about soybeans as harvest begins**
- **Important information before you desiccate dry beans and peas**
- **Scout for soybean aphid**
- **What makes soybean yield?**
- **Water use in soybeans**
- **SMART Day a huge success**



Soybean aphids prefer the newest emerging trifoliolate leaves.

## Soybeans

Soybeans are in the pod filling to early seed stages, R-3 to R-5. Crops reaching R-5 are slightly ahead of previous years and correspond to early varieties, early seeding and/or higher than normal accumulated heat units, especially in southwestern Manitoba.

Despite localized areas being affected by hail and excess moisture, overall yield potential looks good to excellent for soybeans. The recent heat and moisture has been ideal for pod and seed development. The next few weeks will be critical for maintaining yield potential.

Soybeans should not be forgotten as wheat harvest begins. Monitoring for soybean aphid should continue until R-6 (mid August) on a weekly basis. These insects are only detectable upon close inspection. See page 2 for details.

With good moisture and yield potential also comes disease pressure. Diseases favored by wet soil are beginning to show up, including white mould and *Phytophthora* root rot. White mould is being observed in fields with dense canopy cover. The first visible symptoms generally occur during pod development after flowers begin to senesce. Once symptoms are visible, it is too late to manage. Soybeans can generally handle a 10% incidence before significantly affecting yield. Bacterial blight remains evident in fields damaged by heavy rains, wind and hail.

**Table 1.** Average number of days between soybean reproductive stages and to R-7 (physiological maturity)

|            | Average # of days | Range | Average # of days to R-7 |
|------------|-------------------|-------|--------------------------|
| R-1 to R-2 | 3                 | 0-7   | 64                       |
| R-2 to R-3 | 10                | 5-15  | 61                       |
| R-3 to R-4 | 9                 | 5-15  | 51                       |
| R-4 to R-5 | 9                 | 4-26  | 42                       |
| R-5 to R-6 | 15                | 11-20 | 33                       |
| R-6 to R-7 | 18                | 9-30  | 18                       |
| R-7 to R-8 | 9                 | 7-18  | -                        |

Source: Fehr and Caviness 1977

## Dry Beans, Peas

Dry beans are advancing well, with pods 2-5 inches long. Earliest fields have some yellow color. Varietal differences in stand-ability following heavy winds and rain are being observed in our direct harvest trial at Carman. Field pea crops are also looking good and desiccation will soon be underway. Important information for all pulse crop farmers regarding desiccant use this year is [available here](#).

## Scout for Soybean Aphid

Soybean aphids arrived in Manitoba fields around July 10 and are now present in fields across southern Manitoba, including the southwest. It is important for fields to be monitored weekly until the R-6 (full seed) stage which begins in mid-August. Recent thunderstorms have kept populations below threshold in North Dakota and Manitoba thus far.

### Scouting

Scouting for soybean aphid requires close inspection of the plant. Wingless adults are slow moving, small (1/16"), yellow-green, pear-shaped aphids. Their distinct characteristics are dark eyes and black cornicles on the abdomen (**Figure 3**). Look for soybean aphids feeding on the back of soybean leaves, stems and pods. They especially like the newly emerging trifoliolate at the top of the plant. Heavily infested fields will be "sticky" as plant sap is excreted.

Scout at least ten plants in five areas of the field and record the number per plant (0, <50, 50-100, 100-150, 200-250, >250). It is equally important to scout for natural enemies that feed on aphids such as lady beetles and lacewings.

Use the [Aphid App](#) from the University of Guelph on your blackberry or iPhone. The app shows you pictures of natural enemies to look for and provides with decision support based on well-studied thresholds.

### Soybean aphid threshold

The threshold for soybean aphid is one of the most widely studied and accepted threshold of all pests that occur in soybean. Therefore, it should be used with confidence.

The threshold is 250 aphids per plant on 80% of plant in a field, *and rising*. Aphids can be controlled well by natural enemies therefore the number of aphids should be rising before an insecticide application takes place. Scouting should take place weekly, and numbers should be recorded.

### Damage

Soybean aphid has a piercing-sucking mouthpart, feeding on plant sap, reducing nutrient availability to the plant.

### Management

Several foliar insecticides are registered for control of soybean aphid in Manitoba if thresholds have been reached during the R-1 to R-5 stages. Insecticide seed treatments only provide protection for the very early V-stages of soybean, when soybean aphids have historically not been present on soybeans in Manitoba.



**Figure 2.** Aphid colonies consist of both winged and wingless aphids as well as aphid mummies.



**Figure 3.** Soybean aphids are 1/16" long, pear shaped, have dark eyes and black cornicles.

# SMART

SOYBEAN MANAGEMENT & RESEARCH TRANSFER

A total of 200 farmers and industry members participated in our first annual SMART Day on July 22. We are extremely pleased with its success! A summary of the day will be provided at a later date, but for now take a look through the trending hashtag [#smart15](#) on Twitter!

## How is yield formed in soybean?

The reproductive stages R-1 (full flower) through to R-5 (early seed fill) are critical for determining soybean yield. When it comes to yield potential, genetic potential and environment are equally important. Environment is comprised of both biotic (living factors such as diseases, weeds, insects etc.) and abiotic factors (non-living factors including soil, temperature, moisture, sunlight etc.).

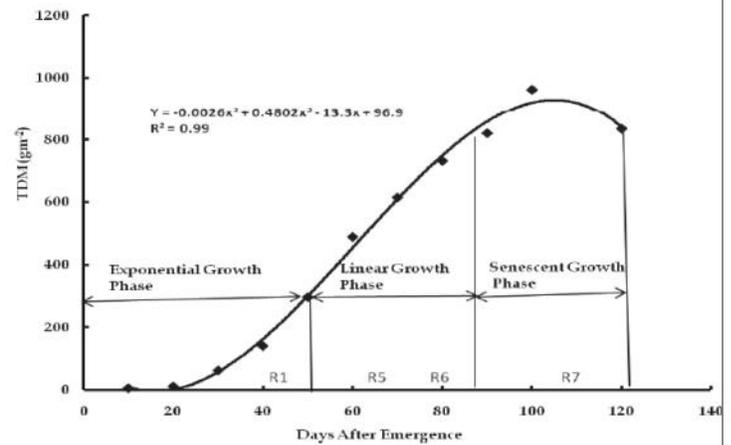
Potential environmental stresses have a final effect on yield by reducing the canopy photosynthetic rate (uptake of CO<sub>2</sub> per unit area), since 75-95% of crop dry weight is derived from CO<sub>2</sub> fixed through photosynthesis<sup>1</sup>. Due to the relationship between photosynthesis and dry weight accumulation, the term Crop Growth Rate (CGR) is used and the seasonal profile for soybean is shown in **Figure 3**. Crop Growth Rate is maximized when leaf area index is large enough to intercept 95% of sunlight. However, a crop may be maximizing light interception but environmental stresses can interfere.

The three most common abiotic stresses for soybean production are temperature extremes, drought and canopy light interception. For example, low temperatures (<10°C) during flowering can cause flower and pod abortion (we saw this in 2013). During drought, plants close their stomata to conserve water but at the same time this reduces the amount of CO<sub>2</sub> that is taken into the plant and converted to dry weight, thus reducing yield (some areas saw this in 2014). Lastly, canopy light interception can reduce yield by not fully utilizing available light. An indication of this is canopy closure and thickness, which is affected by row spacing, plant architecture and leaf morphology (size, shape, orientation).

Fortunately, we are experiencing excellent growing so far in 2015. Yield potential looks good overall despite localized limitations caused by severe weather.

| R-1                | R-2                          | R-3 | R-4 | R-5 | R-6 | R-7 |
|--------------------|------------------------------|-----|-----|-----|-----|-----|
| Reproductive nodes |                              |     |     |     |     |     |
|                    | Pods per node, Seeds per pod |     |     |     |     |     |
|                    | Seed size                    |     |     |     |     |     |

<sup>1</sup> Board and Kahlon, (2011). Soybean Yield Formation: What Controls it and how it can be improved. In H. A. El-Shemy (Ed.) *Soybean Physiology and Biochemistry*. InTech.



**Figure 3.** Seasonal profile of soybean crop growth rate and crop photosynthetic rate.

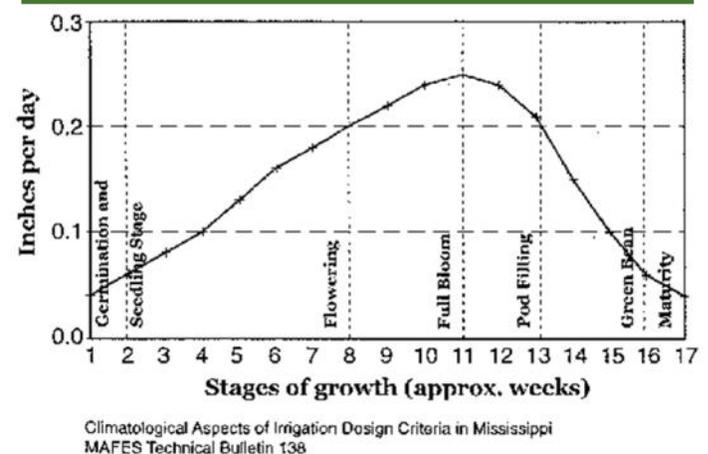
## Water use in soybean

As you likely have observed, soybeans use significantly more water than most of our annual crops including wheat, canola and sunflowers but similar to corn. **Figure 4** shows how soybeans use nearly 1/4" water per day between flowering and pod filling, peaking about 80 days after planting (early August). Nutrient uptake follows a similar trend (N, P, K, S).

Current growing season precipitation (May 1 –July 19) ranges from 180 to >340mm for the majority of the soybean growing region, which is normal to above normal. Drier areas remain in northwest Manitoba.

**Did you know?** 25mm of water has been shown to produce 2.5 bushels of soybean!<sup>2</sup>

<sup>2</sup> Lindsey and Thomison, (2012).



**Figure 4.** Seasonal water use of soybean.