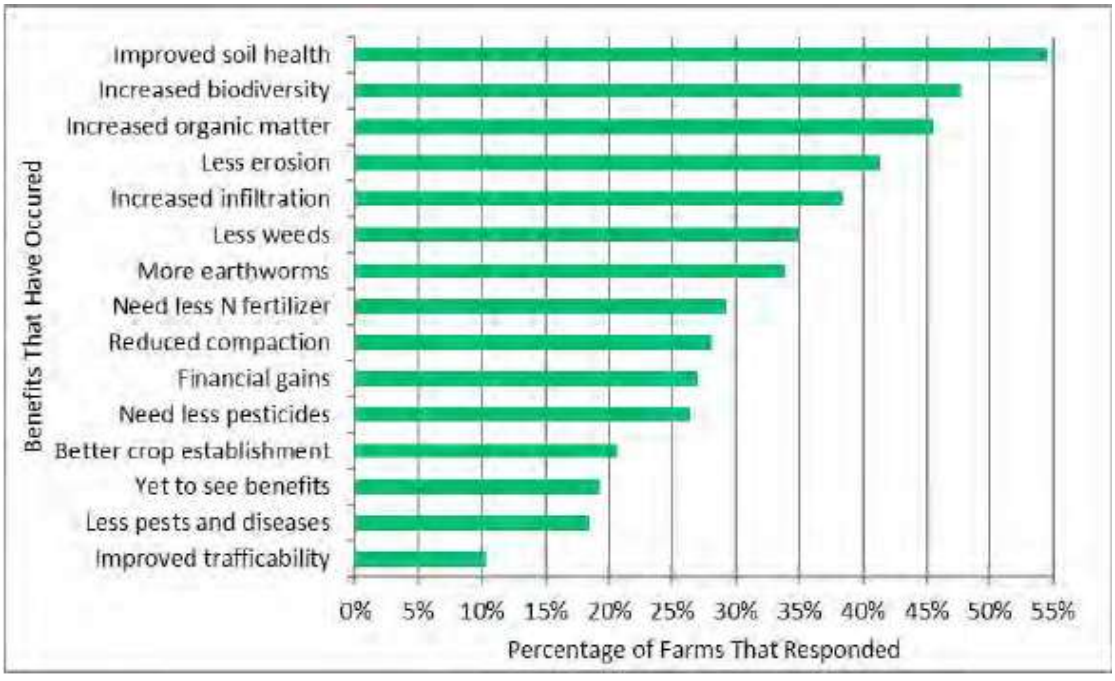
Improving Soil Health Takes Time

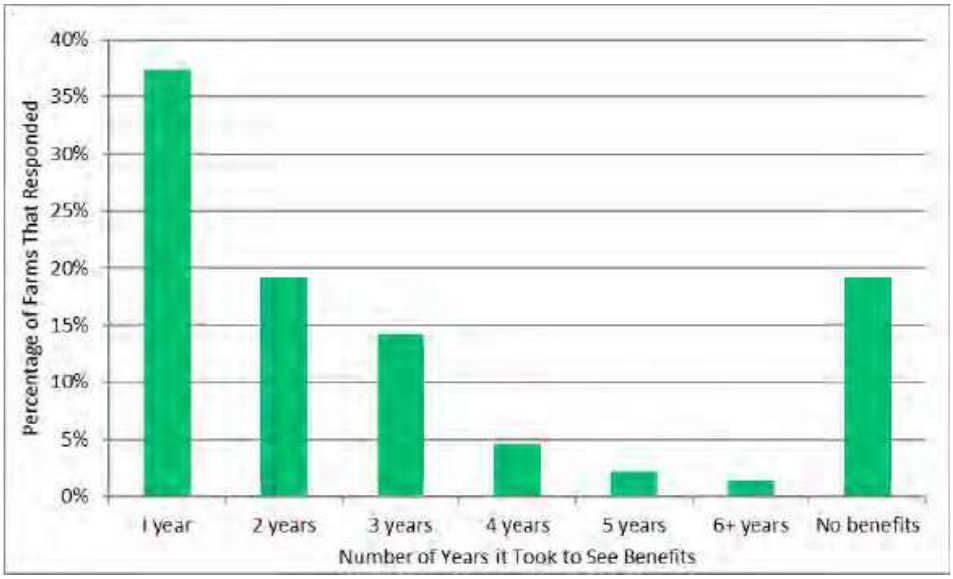
By John McGregor, MFGA Extension Support

Many producers and researchers have found that cropping system practices that greatly reduce tillage and/or no-till (NT) include crop rotations (more than two crops), incorporate cover crops, and use livestock grazing. These can be effective tools for improving soil health and enhancing overall agro ecosystem benefits.

In 2021 the University of Manitoba, Plant Science department releases the 2020 Prairie Cover Crop Survey. The respondents were asked to identify the benefits that have been observed from using cover crops. The majority of farms (81%) reported seeing benefits from growing cover crops, with most farms (68%) reported improved soil health. Other common benefits observed by farms that responded were increased biodiversity (48%), increased soil organic matter (SOM) (46%), less erosion (41%) and increased water infiltration (38%).



The survey then asked how long it took for farms to observe those benefits. Farms that responded reported that benefits from cover crops occurred relatively quickly. The majority of farms (71%) saw benefits from growing cover crops within three years. Over 35 per cent of farms that responded saw benefits from growing cover crops within one year. It should be noted that many of the farms that responded (19%) have not seen benefits from growing cover crops. The report didn't break out how many years it took to see each of the numerous benefits except for profit and reduced tillage.

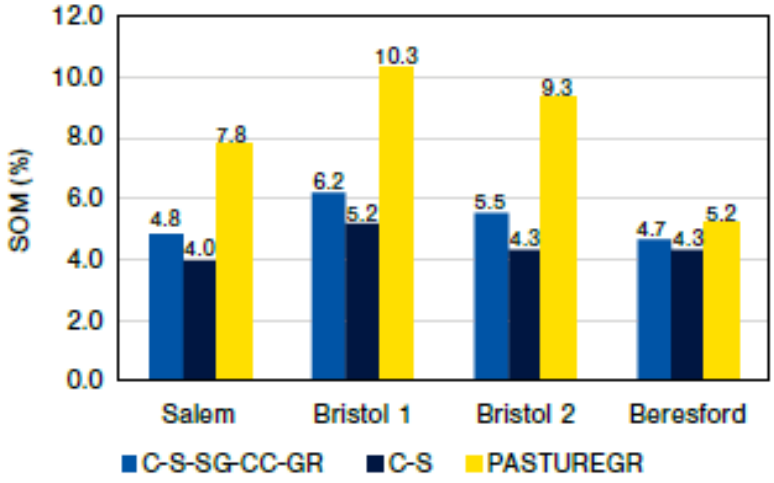


The five top benefits include: improved soil health, increase biodiversity, increased organic matter, less erosion, increased water infiltration and the importance they have on improving and preserving soil. Information on how quickly change can happen can affect expectations when adopting a new practice.

The South Dakota State University (SDSU) carried out a study in 2019 to compare the short and long-term practices of three management practices:
i) a corn soybean-small grains-cover crop-grazing rotation (C-S-SG-CC-GR)
ii) a corn-soybean rotation(C-S), and
iii) a pasture under grazing(PASTUREGR). Pasture was considered a 'check' or a reference point for other two practices.

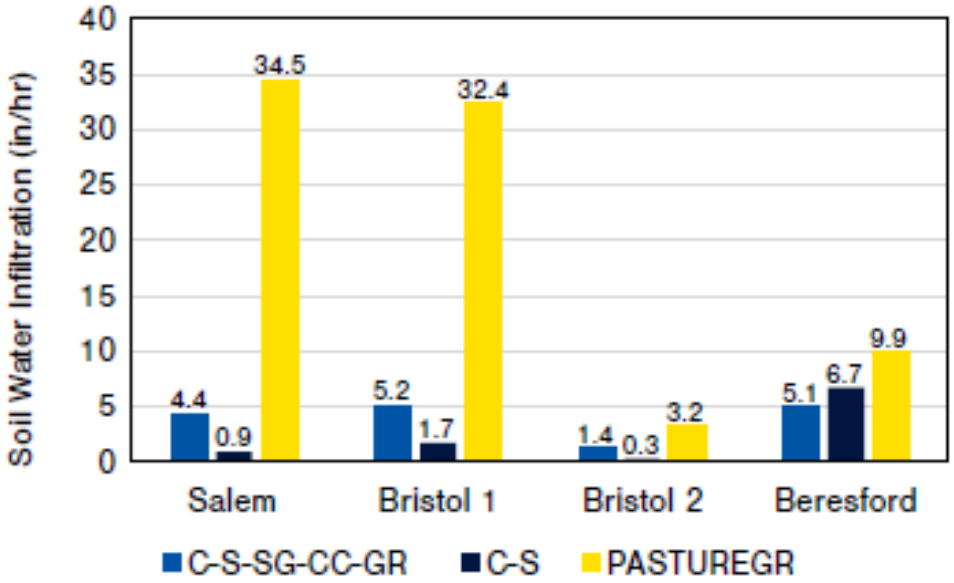
The benefits they were measuring were soil organic matter (SOM), improved soil water infiltration, greater soil porosity and water holding capacity. The long term sites were two Bristol sites and the Salem site. The short term site (3 years) was the Beresford site.

Looking at SOM the study found that SOM was consistently higher for practices with diverse crop rotations, cover crops and grazing at all long-term sites. The differences in SOM were not highly contrasting for short-term site.



Pores or voids in soil hold both water and air. Voids in the top two inches of soil were greater for practices with diverse crop rotations, cover crops and grazing when compared to corn-soy rotation. Additionally, voids and total soil carbon in samples from long-term management systems (i.e. > 30 years) were consistently higher compared to the systems that are just being transitioned to these practices (i.e. 3 years).

Diverse crop rotation along with cover crops and grazing highly enhanced soil water infiltration at all sites (both short and long-term management) when compared with the corn-soybean rotation.



The study concluded that at all long-term sites, diverse crop rotations, cover crops and livestock grazing showed highly improved SOM, water infiltration rate, and soil porosity. These findings suggest that improving overall soil health will require adoption of diversifying crop rotations, incorporating cover crops, and livestock integration in the system for more than three years.

When we look at including cover crops in our farm practices one of the key decisions that needs to be made is what is the benefit or benefits we want. Once that has been decided, the plan has to include how long it might take to reach that goal. Goals of reduced fertilizer might take only one year with the inclusion of legumes as your cover crop. If your goal is to increase SOM, you may have to plan on implementing practices for a longer period of time before you reach that.