

Riparian Vegetated Buffer Zone performance challenges in the Black Brook Study Watershed in New Brunswick

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Over 40 % of Canada's potatoes are grown in New Brunswick and Prince Edward Island. However, there can be consequences to this fairly intensive practice, particularly in areas of rolling topography in high intensity rainfall during the period of late June to August. If appropriate soil and water conservation practices are not followed, soil erosion and runoff may contribute excessive amounts of sediment and agro-chemicals to surface waters.

On agricultural land, a riparian buffer is a permanently vegetated strip of land next to a stream or a body of water. They are designed to protect water quality by reducing the amount of surface runoff, sediment, nutrients and pesticides reaching watercourses. Photographs showing an intermittent stream landscape at the edge of two farm fields in New Brunswick before and after implementation of a vegetated riparian buffer are shown in Fig. 1.



Fig. 1. Photographs showing before (left) and after (right) implementation of a grassed waterway and vegetated riparian buffer soil and water conservation system.

A national Watershed Evaluation of Beneficial Management Practices (WEBs) research program is being led by AAFC to measure the performance of selected agricultural beneficial management practices (BMPs) across Canada on water quality. In one of those studies, a grassed waterway and vegetated riparian buffer zone were implemented an intermittent stream landscape at the edge of two farm fields in New Brunswick and their effectiveness evaluated under up-and-down slope and contour cultivation of potatoes in 2006-07. Preliminary results indicate that in addition to the width of the buffer strip, its effectiveness is greatly affected by rainfall characteristics (intensity and amount) and other conservation practices being used in the field.

Under normal rainfall conditions, this BMP performed as expected to reduce surface runoff and the associated agro-chemicals. For example, with up-and-down slope cultivation of potatoes, during a moderate storm which occurred on June 27-28, 2007 (17.5 mm cumulative rainfall and 23 mm/hr maximum 30-minute rainfall intensity), runoff velocity was considerably reduced at the stream edge of the buffer during peak rainfall. Discharge volume, sediment, nitrate-N, Ortho-P loads of the storm were reduced by 79, 81, 88 and 89 %, respectively.

However, on July 10, 2006 under a more intense storm with 28.5 mm of rain at a maximum 30-minute intensity of 52 mm/hr, the runoff velocity at 15 m inside the buffer was close to or greater than that recorded at the edge of the field.

It is important to note that there was no runoff recorded in the riparian buffer zone downslope of the field in contour cultivation of potatoes during these two years. This suggests that contour planting of potatoes may be a better BMP compared to a vegetated riparian buffer under the New Brunswick conditions of this study with a slope length of about 200 m at 9 % slope. These results also emphasize the need of integrated BMPs to control soil erosion and that no single straightforward solution has complete effectiveness for soil erosion and runoff control under intensive potato production.

The full article with graphics and charts will be available on the ECSWCC web site http://www.ccse-swcc.nb.ca/publications/english/Chow_full.pdf