

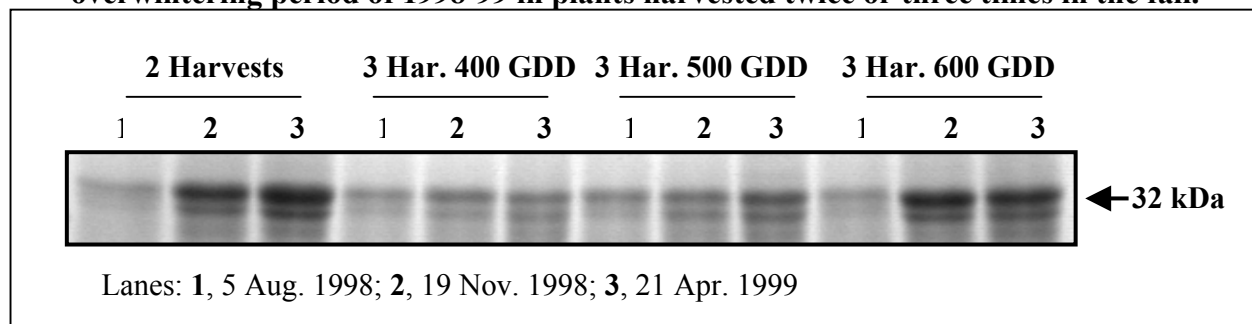
Timing of fall harvest affects VSP accumulation in roots of alfalfa

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Fall harvesting management is a determinant factor for persistence and spring regrowth of alfalfa (*Medicago sativa* L.). The adverse effect of fall harvesting is not only attributable to a reduction in carbohydrates, but also to a decrease in root N reserves (1, 2). Recently, specific soluble proteins of 32, 19, and 15 kDa were characterized as vegetative storage proteins (VSP), and appeared to be key components of overwintering and regrowth of alfalfa (3). The present study assessed the impact of the timing of fall harvest on total soluble proteins and specific VSP, in roots of field-grown alfalfa throughout two growing seasons (1997-98 and 1998-99). Alfalfa was sown in 1996 at a site near Quebec City, and was harvested either only twice during the summer, or three times with the third harvest taken 400, 500, or 600 growing degree days (GDD) after the second summer harvest during the falls of 1997 and 1998.

Fig. 1 Changes in SDS-PAGE profiles of the 32 kDa VSP during the overwintering period of 1998-99 in plants harvested twice or three times in the fall.



Pools of total soluble proteins (mg plant^{-1}) in roots of alfalfa strongly increased from the first production year of 1997-98 to the second one in 1998-99, mainly as a result of an increase in root dry weight. In both production years, the marked accumulation of soluble proteins, observed during fall and winter, was depressed in plants harvested a third time in the fall at either 400 or 500 GDD. SDS-PAGE profiles showed that the abundance of the 32, 19, and 15 kDa proteins was also reduced by harvesting at 400 or 500 GDD (Fig. 1; 32 kDa). Immunodetection assays confirmed that the abundant 32 kDa protein was homologous to the alfalfa VSP previously identified (3), stressing out the strong adverse effect of a fall harvest taken early in the fall (400 or 500 GDD) on the levels of this VSP. Our results confirm the importance of the regrowth interval between the last two harvests, and suggest that an untimely fall harvest affects alfalfa spring regrowth by impeding the accumulation of VSP in alfalfa roots.

References

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