



## Bean Agronomy Network~ *Partnership in Industry*

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Making sense of Irrigation Management of Dry Beans in Southern Alberta.

What is Irrigation Management? By definition, it is insuring water added to the crop through irrigation is used effectively and efficiently and that water is not a limiting factor in achieving maximum/profitable production results. Irrigation management is the process of developing irrigation strategies, to schedule the timing and volume of irrigation events to prevent over or under irrigation applications of water. An effective irrigation management program consists of four elements: (1) agronomic knowledge of the soils and crop, (2) a method of measuring available soil moisture, (3) a means of estimating daily crop water use and (4) an estimate of the application efficiency of the irrigation system. With this information, a water balance may be established for a given dry bean field and the correct amount of water may be applied at the right time.

When managing irrigation water on dry bean, it is important to use the soil as a "bank" or reservoir to store water for crop use. Dry Beans consume 90% of its total water use from an active root zone (normally the upper 60 cm of soil profile). The remaining 10% of water used by the beans crop is obtained from below active rooting zone (60 cm).

Any given soil has two moisture points of interest when dealing with irrigation. One is field capacity (maximum plant available water a soil can hold) and the other is wilting point (zero plant available water present). The difference between field capacity and wilting point is called the available water holding capacity. Knowing the available water holding capacity of a soil becomes very important. The water holding capacity of a soil can be as low as 68 mm, for a sandy soil, or as high as 132 mm for a clay loam soil, depending on the soil texture in the active rooting depth of beans (Table 1).

**Table 1:** Total dry bean available moisture and amount allowed to be depleted before irrigation water is applied

Soil Texture Class	Plant Available Moisture in 60 cm Dry Bean Rooting zone	Allowable Depletion (50% of available moisture)
	mm	mm
<b>Loamy Sand</b>	<b>68</b>	<b>34</b>
<b>Sandy Loam</b>	<b>84</b>	<b>42</b>
<b>Loam</b>	<b>108</b>	<b>54</b>
<b>Sand Clay Loam</b>	<b>92</b>	<b>46</b>

<b>Silt Loam</b>	<b>120</b>	<b>60</b>
<b>Clay Loam</b>	<b>120</b>	<b>60</b>
<b>Silty Clay Loam</b>	<b>132</b>	<b>66</b>
<b>Sandy Clay</b>	<b>104</b>	<b>52</b>
<b>Silty Clay</b>	<b>128</b>	<b>64</b>
<b>Clay</b>	<b>116</b>	<b>58</b>

### Irrigation scheduling

If beans are planted in moist soils, the first irrigation event can likely be delayed to late juvenile stages, unless planted on very sandy soils. Scheduling when to irrigate is best accomplished by using in-field soil moisture determining methods, such as hand feel or moisture probes. During the summer, irrigation management bulletins will be providing crop water use information and forecast estimates based on climatic data (temperature, radiation, wind speed, and relative humidity). Unless you are in an area that has had very little spring precipitation, your first irrigation should be applied after emergence and after 50 to 60 % of available moisture has been depleted from the bean's rooting zone. An allowable moisture depletion of 50 to 60% should be used during the vegetative stages. After flowering, the soil moisture should be kept between 50 and 95% of available. The timing of the last irrigation is very important and should be applied during pod filling stages. More irrigation application events may be required if beans are grown on sandy textured soils with low water holding capacities. Irrigation for the purpose of filling up the soil profile is not required after the beans begin to dry.

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