

PENETRATING ABILITY OF ROOTS OF SOFT SPRING WHEAT UNDER CONDITIONS OF INSUFFICIENT MOISTURE CONTENT

(Part I)

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Wheat germ roots form the primary root system and under conditions of insufficient moisture provide plants with water. Therefore, the depth of penetration of the roots into the soil and the activity of their growth have a significant impact on the plant drought tolerance. Under the conditions of semi-rainfed land, the roots of early-ripening wheat varieties, before the onset of the booting phase, go deeper into the soil (120–134 cm) with an average daily increase in root length of 4.0–4.27–4.88 cm, which is significantly larger than that of late-ripening (121–127 cm and 3.0–3.5–3.76 cm) and mid-ripening (117–125 cm and 3.31–3.44 cm) wheat varieties. The middle-ripening intensive wheat varieties Tselinnaya 26 and Kazakhstanskaya 3 have a lower root growth activity (2.80–2.98 cm day⁻¹). From the phase of booting to earing, the activity of root growth decreases almost three times (1.10–1.34 cm day⁻¹), and in the period from earing to wax ripeness, the roots grow rather slowly (0.34–0.46 cm day⁻¹). The growth of the roots of many early- and middle-ripening wheat varieties stops at the onset of the phase of wax ripeness, and only for varieties Kazakhstanskaya 4, Saratovskaya 42, Kazakhstanskaya 10 and Tselinnaya 26 the growth is observed to full ripeness phase. The roots of wheat plants of these varieties reach 175–180 cm, of late-ripening varieties – 188 cm. These indicators are subject to strong variability, consistently increasing from the tillering phase (5.05% and 8.86%) in the interphase periods 2–4–6 times, which indicates their significant varietal differences. Under the conditions of a semi-rainfed land, at a lack of moisture and high temperatures, the growth of roots depends on the depth of moisture penetration into the soil.

In conditions of dry steppe, the roots of wheat plants penetrate the soil to 136–159-cm depth, and the early-ripening varieties – to a lesser depth. The limiting influence on the depth of roots penetration is exerted by the precipitation in July, activating the growth and development of secondary (stem) roots. Early-ripening wheat varieties do not tolerate early-summer soil moisture deficit typical for the region, therefore they result in lower yields compared to middle-ripening and especially late-ripening varieties that are widely spread in the region.

Keywords: variety, conditions, roots, penetrating ability, growth activity

