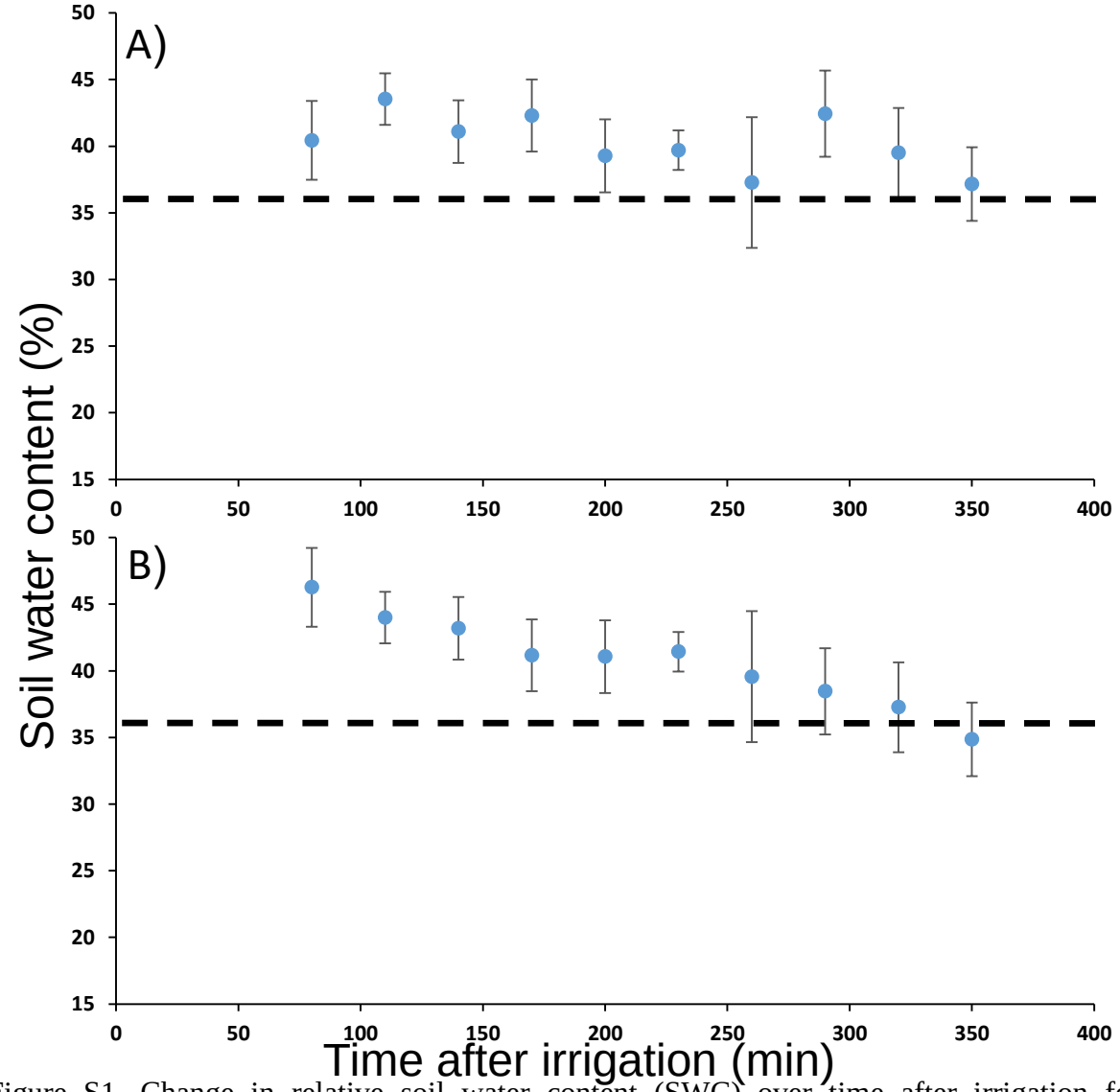

Figure S1. Change in relative soil water content (SWC) over time after irrigation for PI414723 (A) and AY (B) accessions grown at 25°C in 2 L pots. PI414723 plants were grown in five replicates, and AY plants in four replicates. SWC was measured every 30 min using a time-domain reflectometer (TDR). Each pot were measured in three different locations at each time point, and the data was averaged. Dots represent mean ± SD, dashed line represents the average field capacity (~36.5%).

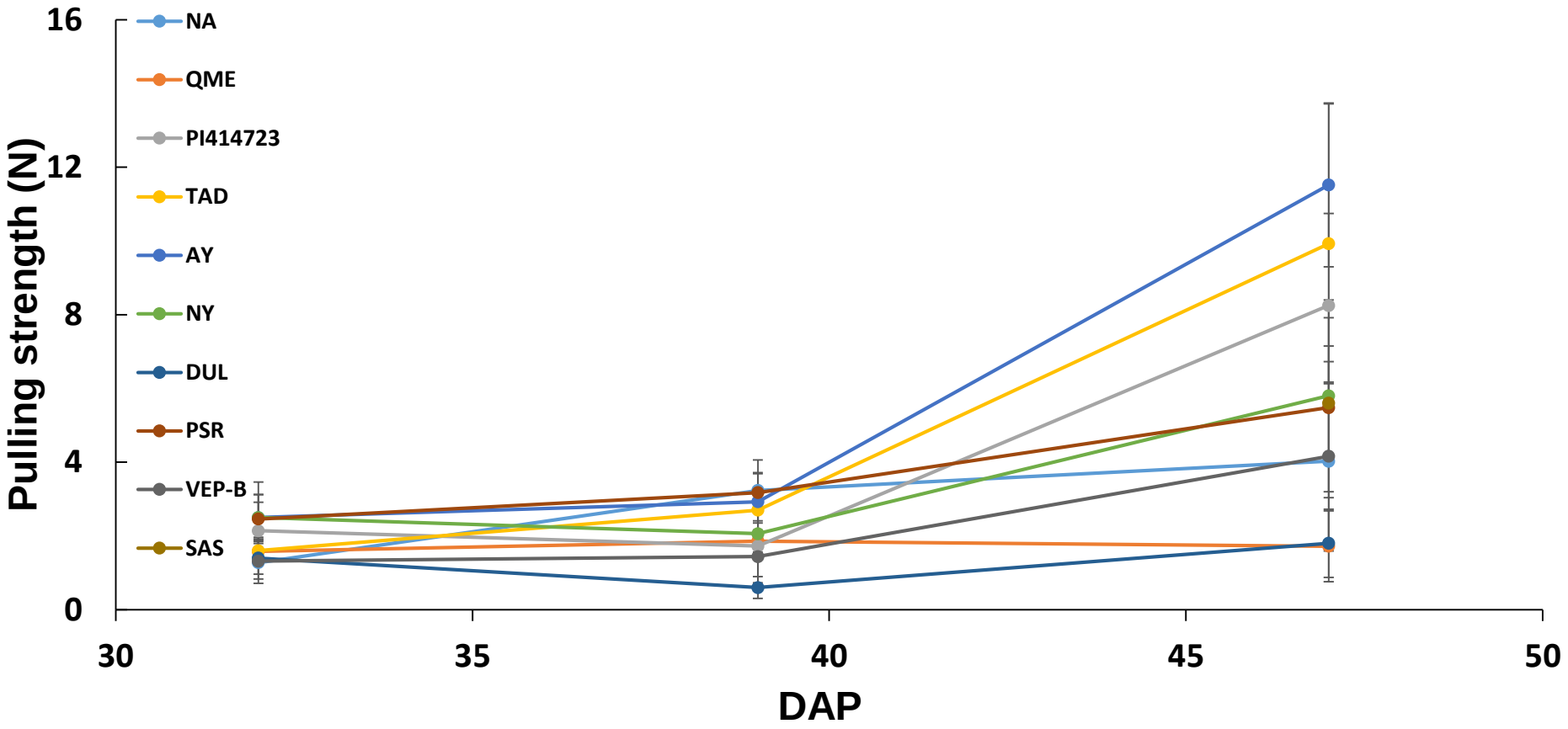

Figure S2. The pulling strength of 10 representative melon accessions in three developmental time points: two-three, four, and four-five true leaves stages (first, second, and third points respectively). In the first two time points, no significant differences were found between accessions. Results from the third time point presented in Figure 1. DAP – days after planting.

Soil Physical Characterization

The soil water retention curve (WRC) was determined using two approaches: (1) direct measurement with the Hyprop–Ksat method, which included fitting the van Genuchten–Mualem model to observed WRC data, and (2) estimation of hydraulic parameters with Rosetta (Hydrus-1D), based on measured bulk density and soil texture.

Both approaches classified the experimental soil as clay-rich, characterized by high water retention, relatively low saturated hydraulic conductivity (K_s), and limited aeration. This combination indicates strong water-holding capacity but poor drainage and a tendency toward waterlogging. Volumetric water content (VWC) values measured by the TDR sensors in this study fell between saturation and field capacity across both WRC methods, suggesting that plants were not under water stress during the experimental period (see figure S3).

Hyprop–Ksat Method

Undisturbed soil cores were collected from the experimental pots and slowly saturated from the bottom over 72 hours. K_s was measured using Ksat devices (METER Group, Germany). WRCs were determined with Hyprop devices (METER Group, Germany) within the pressure range of 0 to –700 cm H_2O. After measurements, samples were oven-dried at 105°C for 24 h to determine bulk density (1.02 g cm^{-3}) and total porosity (0.61 cm^3 cm^{-3}). The van Genuchten–Mualem model was fitted to combined Hyprop datasets using SoilView (METER Group, Germany), incorporating the measured K_s and Rosetta-derived residual water content (θ_r).

Hydraulic Parameters

Table 1. Summary of the fitted and estimated van Genuchten–Mualem parameters, together with volumetric water content at field capacity (FC) and wilting point (WP).

Parameter	Hyprop Fitting	Rosetta Estimate	Unit
α	0.133	0.024	1/cm
n	1.19	1.29	–
θ_r	0.11	0.11	cm^3/cm^3
θ_s	0.6	0.59	cm^3/cm^3
K_s	40.8	67.9	cm/d
VWC at FC	0.35	0.38	cm^3/cm^3
VWC at WP	0.23	0.2	cm^3/cm^3

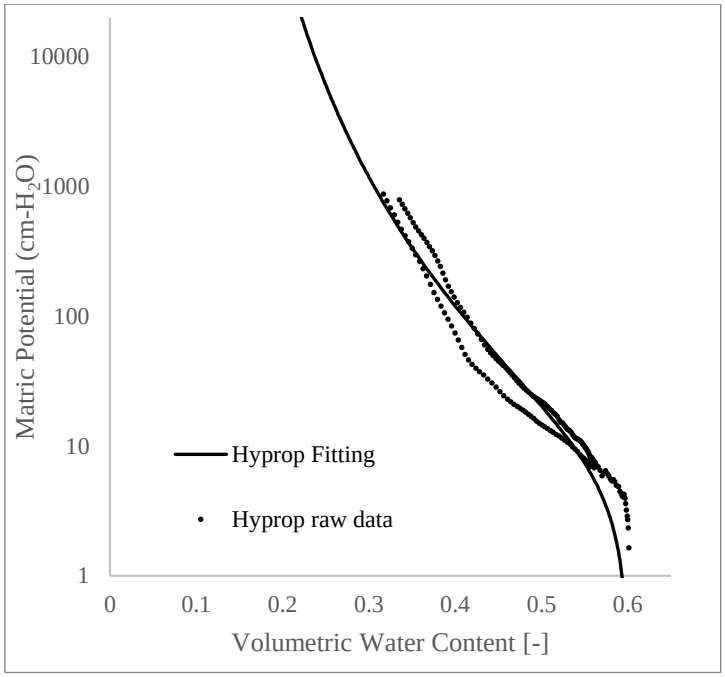

Figure .1 The raw Hyprop data alongside the fitted WRC, as well as the Rosetta-estimated curve.