

Evaluation of Palmer Amaranth (*Amaranthus palmeri*) biotype's response to water stressed growing environments

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INTRODUCTION

- Palmer amaranth (*Amaranthus palmeri*) is a problematic annual broadleaf weed that is native to southwest United States (USDA 2017).
- Palmer amaranth maintains competitive growth against corn (*Zea mays* L.), cotton (*Gossypium hirsutum*), and soybean (*Glycine max*) (Jha 2008)
- A majority of studies are done under ideal growing conditions however in south Texas grower experience times of limited rainfall and therefore control of Palmer amaranth is neglected.
- Therefore, the purpose of this study was to observe how varying levels of water stress can affect Palmer amaranth growth to aid growers in their weed management decisions during drought conditions.

OBJECTIVES

The objective of this study was to determine if soil moisture levels of 25, 50, 75, and 100% had an affect on:

- Growth (height, leaf count, and biomass)
- Chlorophyll content
- Stomatal Conductance

MATERIALS AND METHODS

The study was conducted at the Texas A&M University- Kingsville Research Greenhouse (27°31'50.4"N 97°53'13.8"W) during June and July of 2020.

Three biotypes of Palmer amaranth:

- “OLD” (Azlin Seed Source, Leland, MS)
- “NEW” (Azlin Seed Source, Leland, MS)
- “KPW” (Kleberg County, Texas)

Soil Moisture Treatments:

- 25, 50, 75, and 100%

Methods:

- Seeds from each biotype were scarified by a sulfuric acid bath and dried for 24 hours
- Seeds were planted and once cotyledons emerged, plant were transplanted into pots filled with sifted sandy loam soil (Kleberg Co.)
- Plant were watered to reach desired water treatment 1 week before trial started
- Data was collected at 3, 7, 14, and 21 days after trial start date on plant growth, stomatal conductance, and chlorophyll content
- Plants were harvested at 21 DAT and biomass was collected and samples were dried for 8 days.
- Mean separations were performed with SAS 9.4

RESULTS

Figure 1. Soil Moisture affect on height by biotypes at 21 DAT

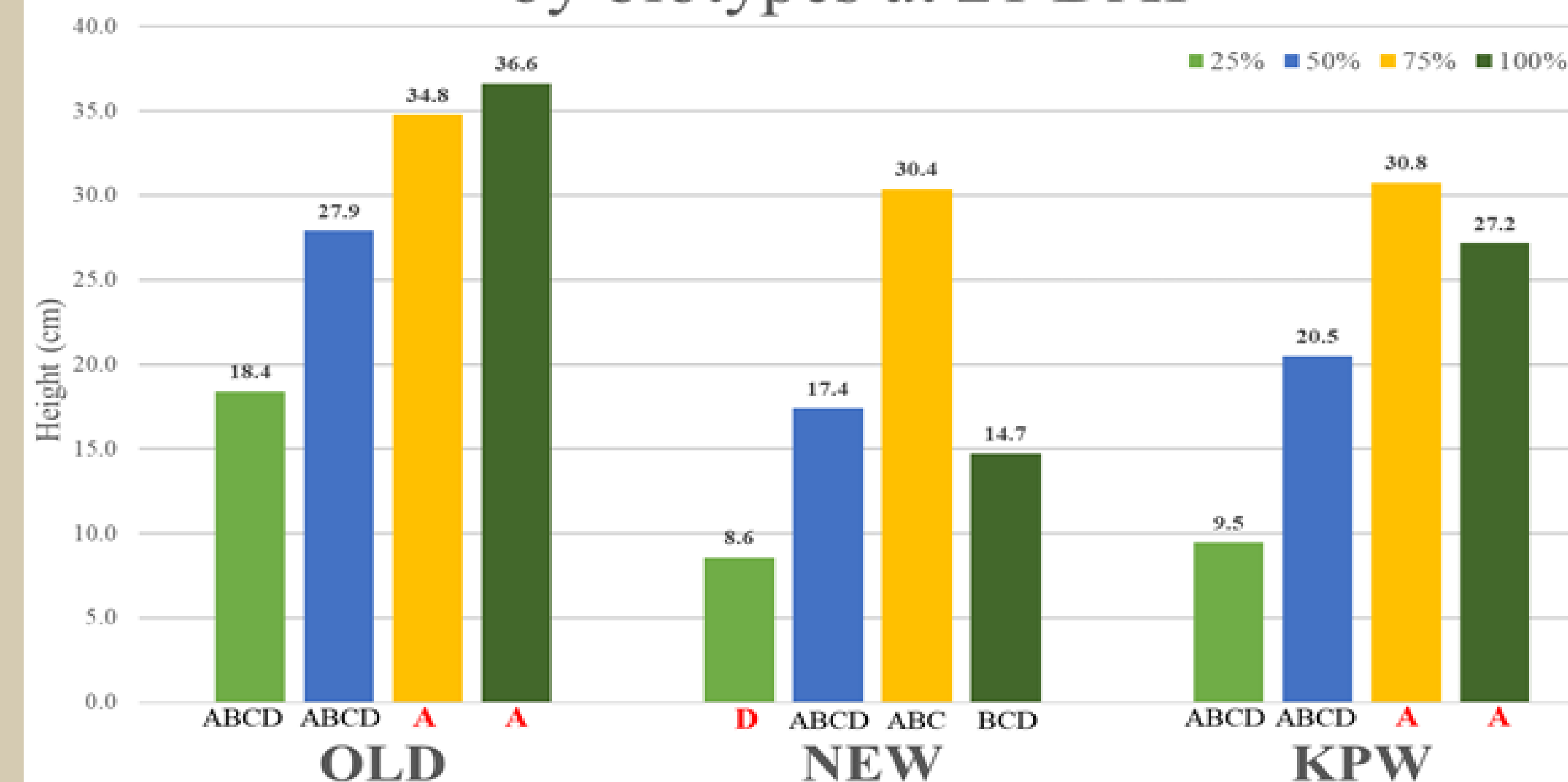


Figure 4. Soil Moisture affect on stomatal conductance by biotypes at 21 DAT

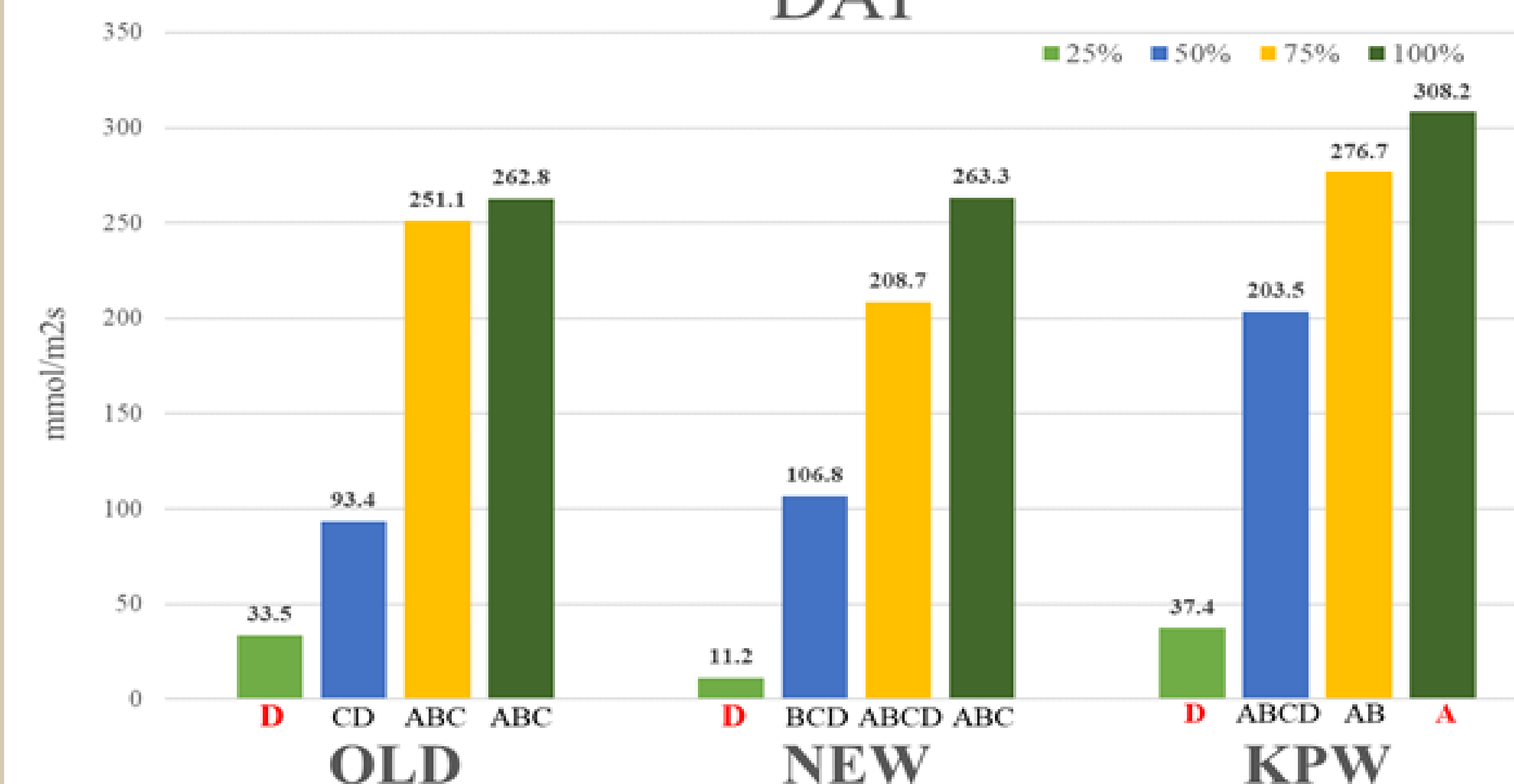
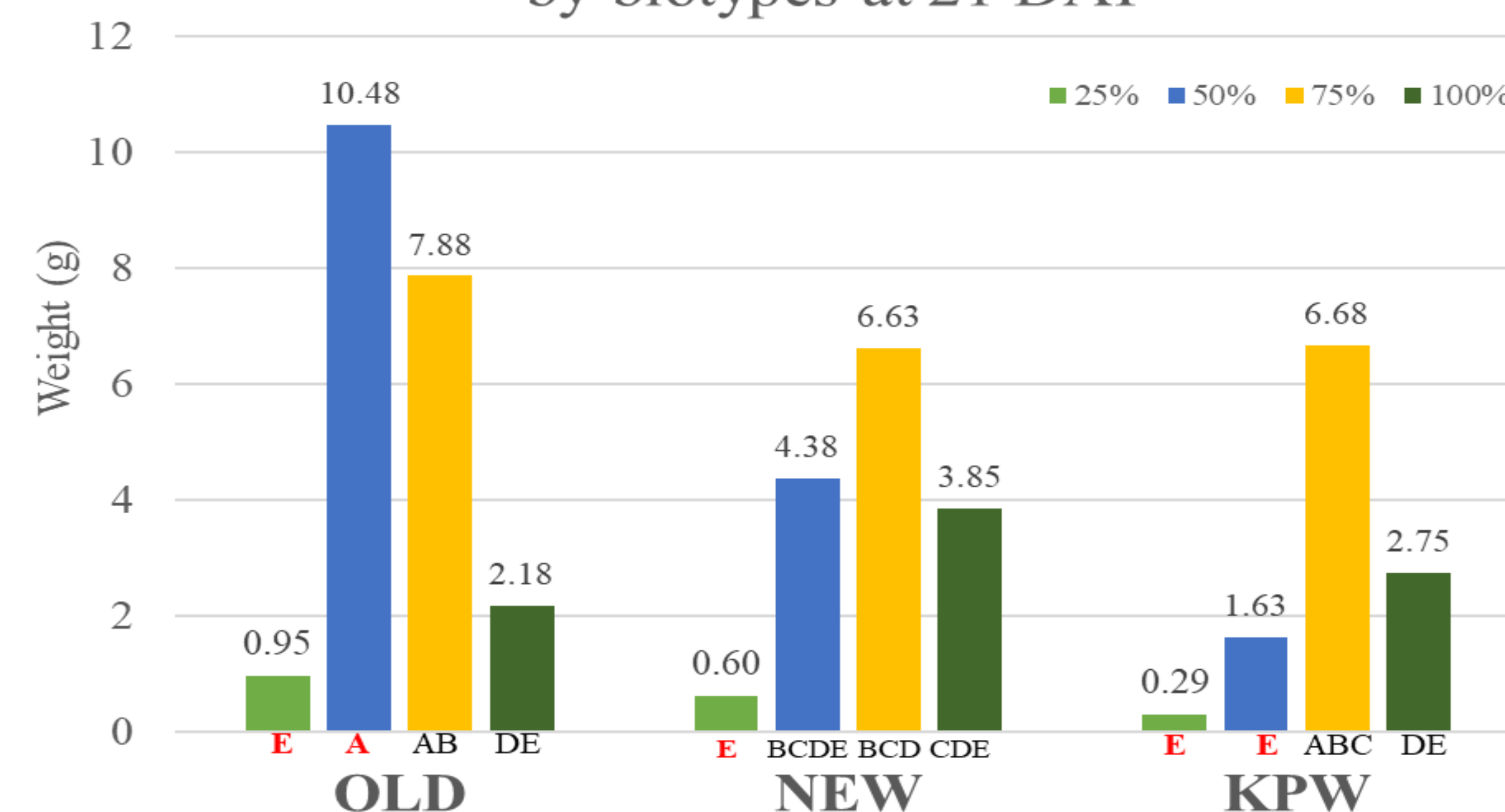


Figure 5. Soil Moisture affect on dry weight by biotypes at 21 DAT



CONCLUSIONS

- OLD biotype grown in 50% water treatment continued to show advanced height growth and biomass.
- Biotypes played a role in plant height and biomass which we could attribute to the adaptations from their original growing environments (Texas vs Mississippi).
- Consequently, this study highlights that Palmer amaranth will continue to grow under water stressed environments which is critical for growers who do not control actively growing Palmer amaranth weeds.
- Further studies should include more replications of this trial to truly see the effect as well as examine the duration period of survival.



OLD biotype Palmer amaranth at 25, 50, 75, 100%



Palmer amaranth distinct watermark on leaves

REFERENCES

- United States Department of Agriculture (2017) Palmer Amaranth. https://www.fsa.usda.gov/Assets/USDAFSAPublic/usdfiles/FactSheets/archived-factsheets/palmer_amaranth_nrcs_national_factsheet.pdf. Accessed June 9, 2020.
- Jha, P, JK Norsworthy, MB Riley, DG Bielenberg, W Bridges (2008) Acclimation of Palmer Amaranth (*Amaranthus palmeri*) to Shading. *Weed Science* 56:729–734

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