UDC: 633.34:632.4:581.132 DOI: https://doi.org/10.53040/ppap2026.132

# PHOTOSYNTHETIC PARAMETERS OF HEALTHY AND LEAF-BROWN SPOT-AFFECTED SOYBEAN PLANTS

HARCIUC Oleg[1,*], https://orcid.org/0000-0003-3488-5321
CHISTOL Marcela[1], https://orcid.org/0000-0001-8594-151X
SCERBACOVA Tatiana[1], https://orcid.org/0000-0002-2632-325X
SHIMIZU Masafumi[2], https://orcid.org/0000-0001-9103-1432
VOLOSCIUC Leonid[1], https://orcid.org/0000-0002-7475-4310

*[1]Moldova State University, Institute of Genetics, Physiology and Plant Protection, Chişinau, Republic of Moldova*
*[2]The United Graduate School of Agricultural Science, Gifu University, Japan*
**Corresponding e-mail: oleg.harciuc@sti.usm.md*

Leaf spot diseases in soybeans significantly disrupt normal physiological and photosynthetic functions. Leaf spot of soybeans can be caused by various pathogens: *Septoria glycines* Hemmi, *Colletotrichum sojae* Damm & Alizadeh, *Colletotrichum glycines* Hori, *Ascochyta sojaecola* Abramo, *Alternaria alternata* (Fr.) Keissl, *Fusarium solani (Mart.) Appel et Wr.* and *Peronospora manshurica*. The aim of our study was to determine some photosynthetic parameters for healthy soybean plants and those affected by brown leaf spot under natural field conditions at the Institute of Genetics, Physiology and Plant Protection of Moldova State University.

The objects of our work were plants of Aura variety, 80 days after planting. The photosynthetic parameters were measured by the field portable photosynthesis system LCpro-SD, developed and manufactured by ADC BioScientific (United Kingdom). The main parameters were photosynthetically active radiation (PAR), photosynthetic rate (A), transpiration rate (E), stomatal conductance ($g_s$) and intercellular $CO_2$ concentration ($C_i$).

Although the primary causative agent of soybean leaf spot is considered to be *Septoria glycines* Hemmi, at leaf-brown spot-affected soybean plants were determined *Colletotrichum* sp., fungal pathogens that cause anthracnose in soybeans (*Glycine max*). The main distinguishing feature of the spotted areas on 'Aura' leaves was a significantly higher $C_i$ (despite high, optimal PAR levels), measurable $CO_2$ exchange was virtually absent. In the affected plants, $CO_2$ exchange in even visually healthy (green) leaves was lower than that in the leaves of healthy plants (showing

no signs of spotting). Water-use efficiency (A/E) was significantly lower in spotted leaves compared to green leaves.

**Conclusions.** Under natural conditions, *Colletotrichum* sp. fungi were identified on soybean plants affected by leaf spot. The rate of net photosynthesis in the leaves of affected plants was significantly lower than in healthy plants.

**Keywords:** Soybean, leaf brown spots, leaf gas exchange.

**Acknowledgments.** This research was supported by the project 2580012.5107.12SE "Determining the relationships between symbiotic nitrogen-fixing microorganisms and biotic and abiotic factors aimed at enhancing soybean protection and productivity", funded by National Agency for Research and Development and by the Subprogram 011103 "Development of ecologically harmless means of reducing the impact of harmful organisms of agricultural crops against the background of climate change", funded by the Ministry of Education and Research of the Republic of Moldova.