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## ABSTRACT

The mobile phenotyping system ensures control over the growth parameters, morphological features and physiological features of English oak (*Quercus robur* L.) seedlings against the background of breeding treatments consisting mainly of nutrient supplementation and irrigation. The results of measurements are an important element of the management strategy at the container nursery and the verification of breeding progress, which is to result in high-quality material for regeneration on forest cultivation areas.



Photo 1. Plant scanners over the field of forest seedlings (from the left) ACS-435 Holland Scientific, VEGA C21 VEGAPLUS, IR SI-100SS Apogee

## METHODS & RESULTS

The measurement module consists of three parts: the ACS-430 Holland Scientific multi-channel scanner for reflectance measurement, the VEGA Plus URLs laser sensor for seedling height measurement and the Apogee SI-100SS radiometer for measuring the leaf surface temperature (Fig. 1-3, Tab. 1). The entire system is based on the GP2 Delta-T Devices datalogger and the GeoScout-X Holland Scientific data acquisition unit. The system was deployed in Daleszyce forest nursery, Poland.

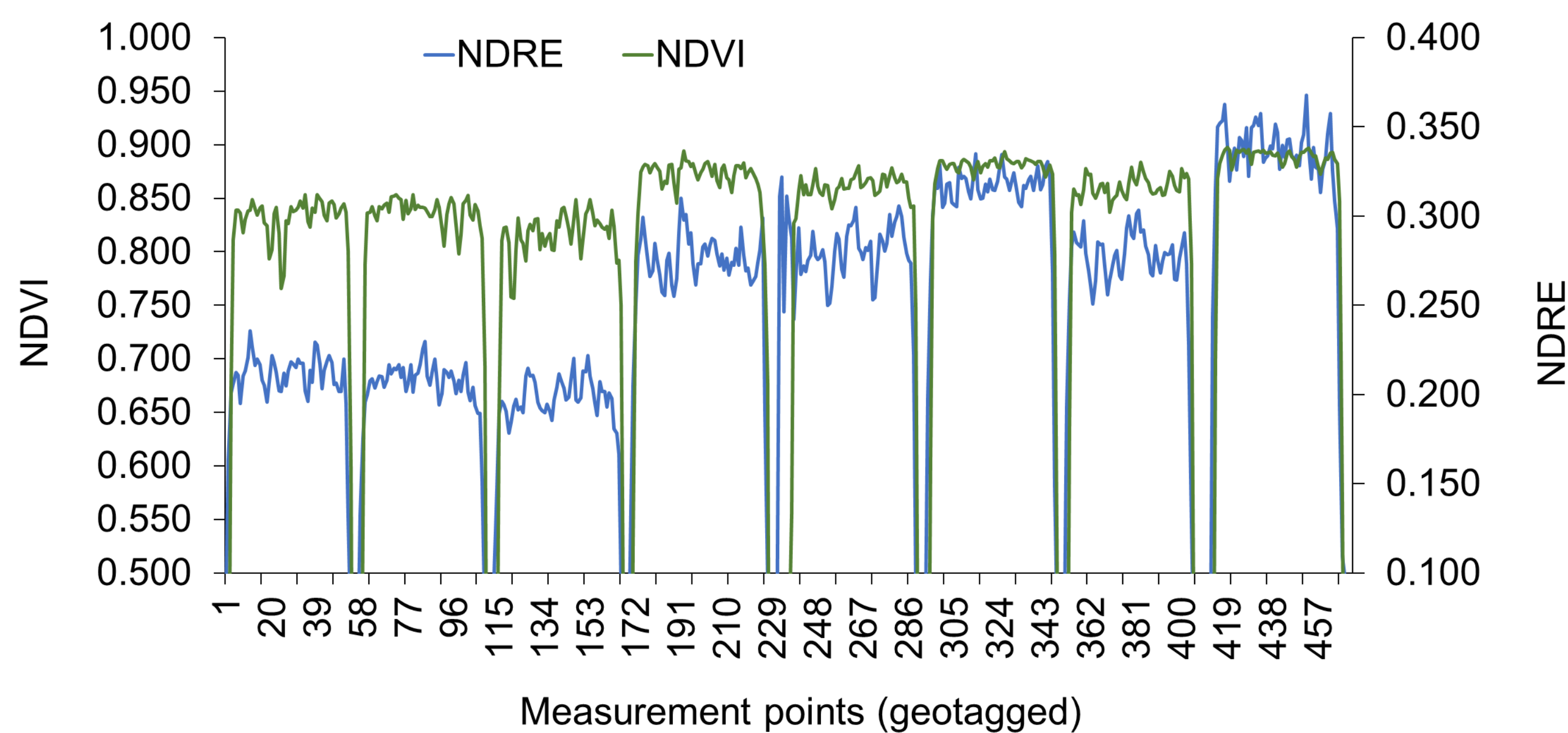


Fig. 1. Vegetation indices for English oak produced on 8 various type of substrate and different fertilization methods, daily average 90 days after sowing

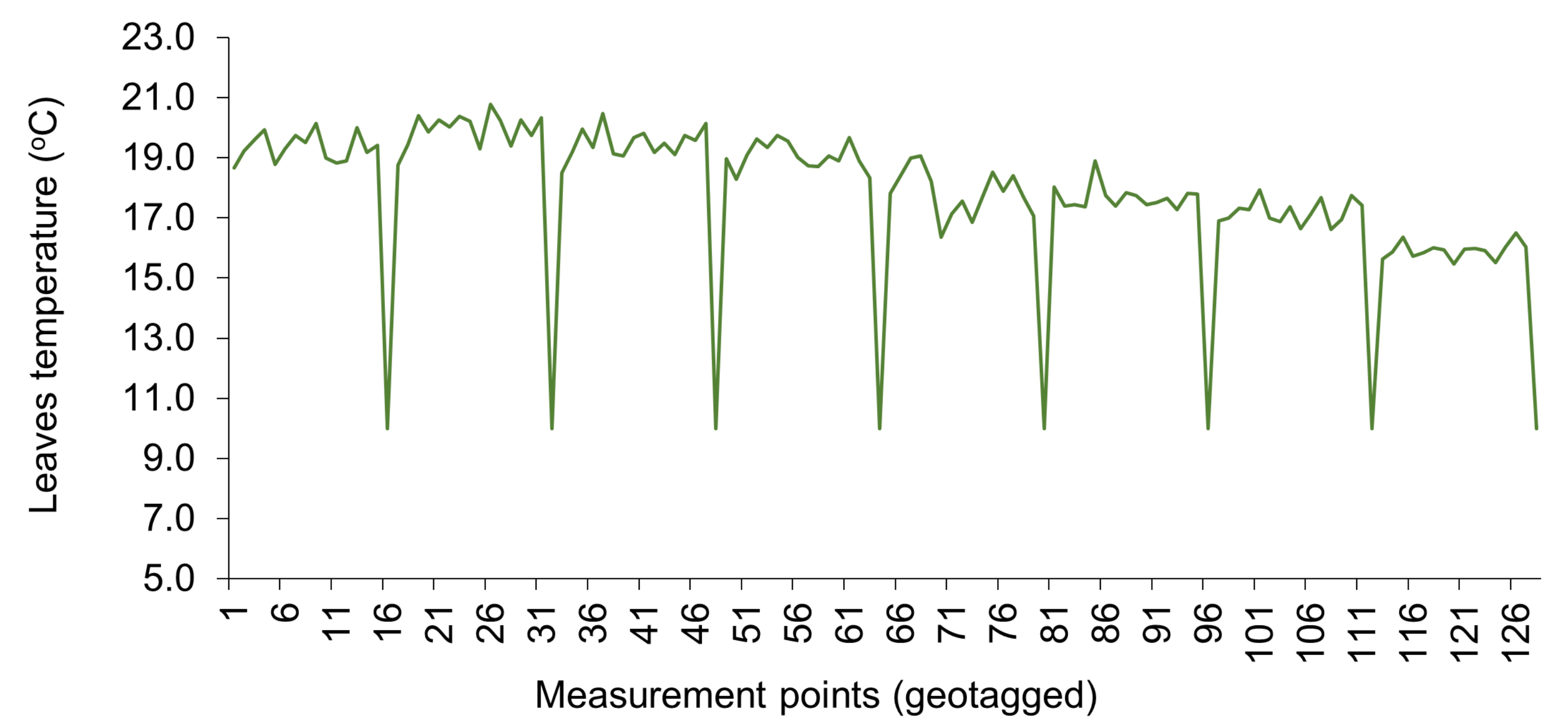


Fig. 2. Leaves temperature of English oak produced on 8 various type of substrate and different fertilization methods, daily average (2022-07-26)

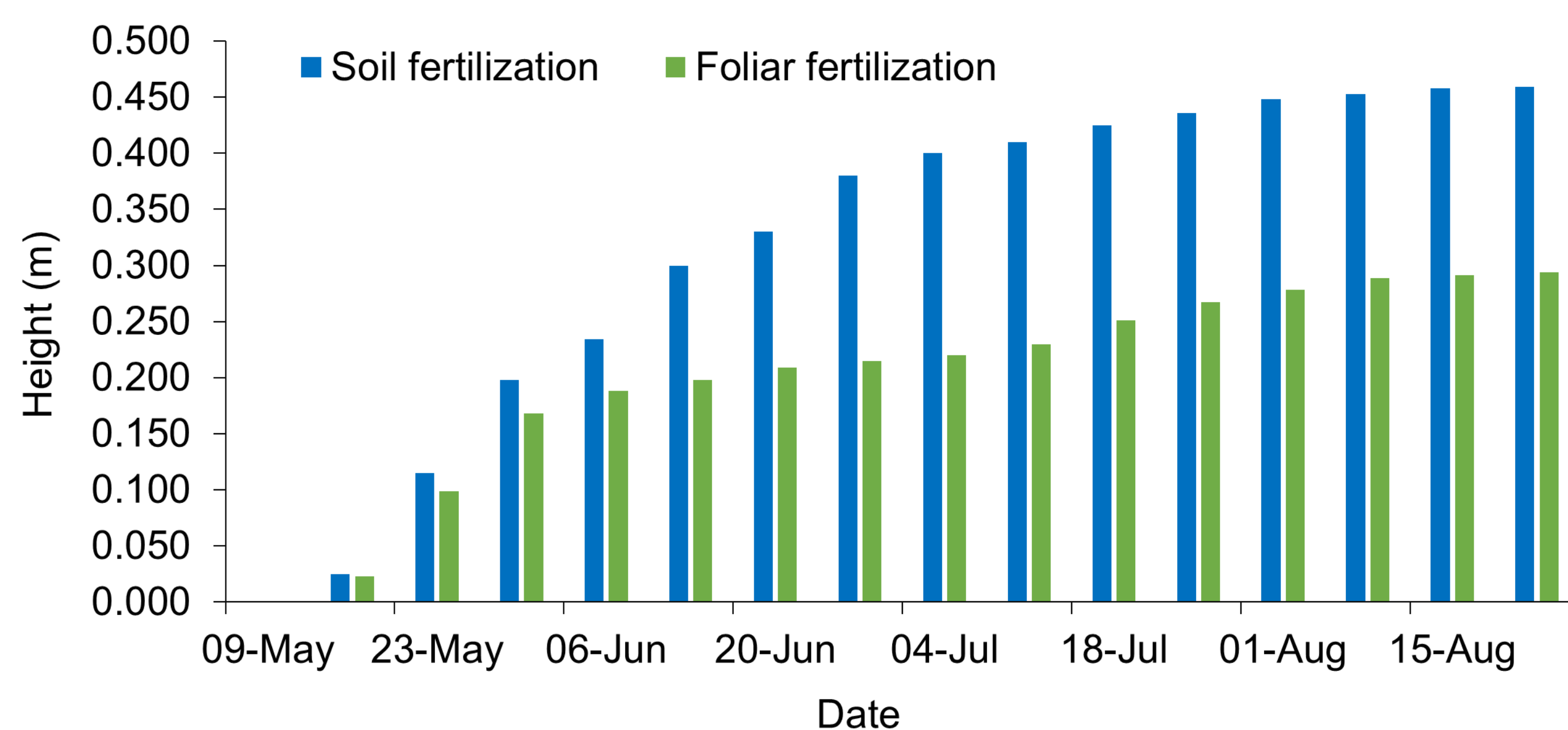


Fig. 3. Height of English oak produced on two types of nursery substrate that is: soil fertilization (blue bars) and foliar fertilization (green bars)

Table 1. Decade averages of NDRE index, LAI and height for English oak produced on experimental nursery substrate (soil fertilization)

Series	Date	NDRE	LAI (m <sup>2</sup> /m <sup>2</sup> )	Height (m)
1	2022-10-05	No data	No data	0.090
2	2022-20-05	0.164	0.97	0.115
3	2022-30-05	0.173	1.69	0.198
4	2022-10-06	0.189	2.34	0.244
5	2022-20-06	0.204	2.88	0.300
6	2022-30-06	0.231	3.02	0.330
7	2022-10-07	0.278	3.25	0.380
8	2022-20-07	0.282	3.72	0.400
9	2022-30-07	0.299	4.03	0.425
10	2022-10-08	0.335	4.22	0.448
11	2022-20-08	0.338	4.44	0.458
12	2022-30-08	0.332	4.98	0.462

## CONCLUSION

The implementation of a precise diagnostic system for forest tree seedlings in container nurseries turned out to be very useful in assessing the effectiveness of breeding treatments. High accuracy and repeatability of measurements provides objective material, thanks to which the grower can adjust the work schedule on an ongoing basis and optimize treatments in accordance with the plant's requirements.

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