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Preliminary results of dandelion cultivation under different seeding rates and harvest regimes

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Abstract

In the past, several wild plants were widely consumed as food by humans. Dandelion [*Taraxacum officinale* (L.) Weber ex F.H. Wigg] is a wild species with remarkable nutritional and medicinal properties. Many studies have investigated the chemical components of the plant for human health. Nonetheless, little research has been carried out on the cultivation and related production of this species. With this study, we intend to investigate some cultural practices to start defining an efficient protocol for dandelion cultivation in northern Italy. Two seeding rates (0.14 and 0.55 g m^{-2}) and two harvest regimes (when leaves reached a length of 20 cm and 1 week later) were compared. Leaf fresh weight yield was determined at each harvest, and the following morphological parameters were measured: plant height, number of plants per square meter, number of leaves per square meter, leaf area index, number of leaves per plant, leaf weight, and specific leaf weight. The productivity of dandelion was found to be unaffected by the seeding rate, and no significant differences were found between harvest regimes. The delayed harvest regime was only advantageous at the first cut as it allowed for a longer establishment phase, resulting in a higher yield. The nitrate content in the leaves differed between the first two cuts and the third and fourth cuts with both harvest regimes and both sowing rates.

1 | INTRODUCTION

Dandelion [*Taraxacum officinale* (L.) Weber ex F.H. Wigg] is a cosmopolitan perennial species belonging to the *Asteraceae* family. The plant has a strong, deep taproot with secondary roots and the leaves are arranged in a basal rosette from the center of which the stem extends. The dark green leaves range from 5 to 20 cm in length and 1 to 4 cm in width and are highly variable in shape, from oblanceolate to obovate, sometimes lobeless, and in other cases highly incised. The flower head is a capitulum, 2.5- to 4-cm diameter, composed of ligulate flowers with a yellow corolla. The dandelion fruit is an achene with a pappus that favors wind dispersion. This species has a cosmopolitan distribution. It is native to Western Europe and Northern Asia and is widely spread throughout Europe, Asia, and the Americas. In Italy, it is found in medium-high productive meadows and ruderal and anthropized environments with a distribution ranging from lowland areas to mountains up to 1700 m a.s.l. (Jalili et al., 2020; Pignatti, 2017).

Abbreviations: LAI, leaf area index; LDW, leaf dry weight; LFW, leaf fresh weight; SLW, specific leaf weight.

Numerous studies and reviews have reported the benefits of dandelion for human health. Choi et al. (2018) isolated compounds from dandelion plants that have hypoglycemic effects through the inhibition of α-glucosidase and α-amylase. Other studies have shown that dandelion extract stimulates insulin secretion from pancreatic β-cells in vitro (Di Napoli & Zucchetti, 2021). An in vivo experiment conducted by Davaatseren et al. (2013) showed that leaf extracts reduce blood glucose, cholesterol, and triglyceride levels. Ethanolic leaf extract was found to increase urinary frequency in healthy humans (Clare et al., 2009) and also increase the number of cells such as leukocytes, lymphocytes, and neutrophils when combined with doxorubicin (Kasianningsih et al., 2011). An enhanced immunity response is also associated with the use of this species (Tan et al., 2017). Davaatseren et al. (2013) reported that extracts from the dandelion plant can prevent non-alcoholic fatty liver disease. Choi et al. (2010) investigated the possible hypolipidaemic and antioxidative effects of dandelion leaves and roots and found that plasma antioxidant enzyme activities and lipid profiles were positively modified in treated individuals. Other studies have shown that pancreatic lipase is inhibited by the functional bioactive ingredients of dandelion (Aabideen et al., 2020). Moreover, the plant was found not to exhibit any toxicities (Jalili et al., 2020).

Despite the numerous studies showing the beneficial effects of this species on human health, only a few have investigated its nutritional profile, cultivation methods, and prospective production performances. Biel et al. (2017), for instance, found that 100 g of fresh leaves contain approximately 88.5 g of moisture, 1.70 g of crude ash, 2.20 g of crude protein, 0.69 g of crude fat, 1.24 g of crude fiber, 77.1 mg of calcium, 748.7 mg of potassium, 0.46 mg of zinc, 1.45 mg of tocopherols, 18.0 mg of ascorbic acid, and 10.8 mg of carotenoids. Gill (2015), Alexopoulos, Assimakopoulou et al. (2021), and Alexopoulos, Marandos et al. (2021) successfully investigated nutrient solution characteristics and management in soilless production systems (i.e., a floating hydroponic system, the nutrient film technique, and the deep flow technique). Escudero et al. (2003) analyzed the nutritional components of dandelion and showed that the leaves represent a potentially important source of minerals such as calcium, potassium, and magnesium, insoluble and soluble fibers, vitamins (A and C), and fatty acids (linoleic, linolenic, oleic, stearic, and palmitic), and that dandelion has high levels of vitamin C and provitamin A and a good Ca/P ratio. They also explored the dandelion antinutrient factor, such as nitrate content, and found no appreciable risk to human health as the concentration was low.

Nitrate content is an important qualitative trait in vegetables because of its potential consequences for human health. Nitrates are involved in chemical reactions whose products (metabolites, including nitrite, nitric oxide, and N-nitroso compounds) are carcinogenic (Colla et al., 2018; EFSA, 2008; Santamaria, 2006). Nitrate content is also associated with methaemoglobinaemia, which is more common in infants (McNulty et al., 2022). Strict limits are therefore imposed on the nitrate contents of several leafy vegetables (i.e., lettuce [*Lactuca sativa* L.], spinach [*Spinacia oleracea* L.], and rocket [*Eruca sativa* Mill.]) by the European Community, and others are regulated by national laws (European Commission, 2011; Santamaria, 2006). The nitrate concentration also depends on the age of the plant tissue (Colla et al., 2018; Maynard et al., 1976), with older leaves having higher contents (Ferrante et al., 2003). Environmental conditions during the growth cycle also affect nitrate concentrations, light availability being one of the most important (Bian et al., 2020; Signore et al., 2020). Light affects the nitrate content by regulating nitrate reductase gene expression and enzyme activity and by providing products of photosynthesis that are essential to support the high energy-demanding process that is nitrate reduction (Fan et al., 2019). Thus, light intensity influences the nitrate content in the leaves, which is higher in low-light conditions (Cantliffe, 1972; Colonna et al., 2016). The species, cultivar and genotype, and cultivation practices, such as the use of nitrogen fertilizers (Colla et al., 2018), also play a key role in leaf nitrate content.

Although wild plants have traditionally been used as food sources or for medicinal purposes, this species is not cultivated but is instead gathered in uncultivated or semi-natural areas. Wild rocket (*Diplotaxis tenuifolia* L.) is a rare example of a wild plant that is cultivated today (Caruso et al., 2018). There is now renewed interest in these wild species as part of the search for healthy, nutrient-rich foods and alternative crops that are resilient to climate change (Grauso et al., 2019; Mattirolo et al., 2001). The aim of this study was to assess the suitability of dandelion for large-scale food production by evaluating its performance under high-density cultivation in open field conditions. A field trial was carried out in north-eastern Italy to evaluate the stand density, canopy features, fresh leaf yield, and leaf nitrate content of dandelion grown under two seeding rates and two harvest regimes.

Core Ideas

- Dandelion is a wild species that can be intensively cultivated for human nutrition.
- Two seeding rates and two harvest regimes were tested over four cuts during the dandelion growing period.
- Seeding rate and harvest regime affected dandelion leaf yield and nitrate content.
- Dandelion annual productivity was unaffected by the seeding rate and harvest regimes.
- Nitrate content was affected by the interaction between harvest regime, cut, and seeding rate.

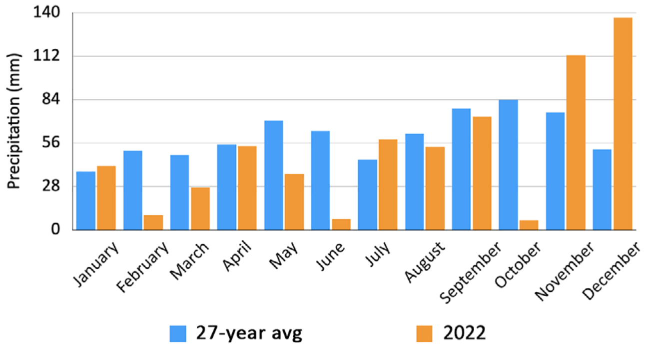

FIGURE 1 Monthly precipitation at the "Po di Tramontana" experimental center (Rosolina, Italy; 45°04′03.7″ N, 12°15′43.7″ E; 1 m a.s.l.) in the study year (2022) and long-term averages (1994–2021).

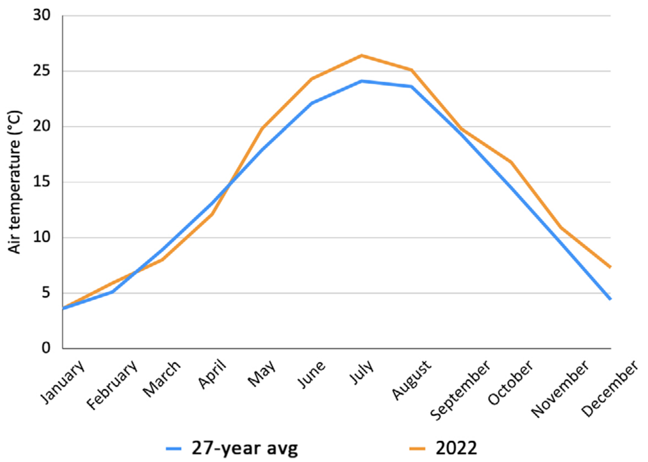

FIGURE 2 Monthly mean air temperatures at the "Po di Tramontana" experimental center (Rosolina, Italy; 45°04′03.7″ N, 12°15′43.7″ E; 1 m a.s.l.) in the study year (2022) and long-term averages (1994–2021).

2 | MATERIALS AND METHODS

A field trial was established on April 14, 2022 at the "Po di Tramontana" experimental horticultural center (Veneto Agricoltura) in Rosolina (north-eastern Italy; 45°04′03.7″ N, 12°15′43.7″ E; 1 m a.s.l.). The soil was a sandy loam (69.4% sand, 10.3% clay, and 20.3% silt), with a pH of 8.3, 1.5% organic matter, a C:N ratio of 0.99, 0.8% nitrogen (combustion method), 18.2 mg phosphorus kg^{-1} (Olsen method), and 275.5 mg potassium kg^{-1} (buffered $BaCl_2$ method). The long-term (27-year data) mean rainfall is 720 mm $year^{-1}$, and the annual mean air temperature is 13.8°C (9.4°C minimum and 18.2°C maximum) (Regional Agency for Environmental Protection of Veneto Region, 2021). Monthly precipitation, mean air temperatures, and mean solar radiation during the study period and the long-term averages are presented in Figures 1–3.

FIGURE 3 Monthly mean solar radiation (MJ m^{-2}) at the "Po di Tramontana" experimental center (Rosolina, Italy; 45°04′03.7″ N, 12°15′43.7″ E; 1 m a.s.l.) in the study year (2022) and long-term averages (1994–2021).

Dandelion was seeded on April 14, 2022, and the seed was bought on the local market (Fratelli Ingegnoli). The specific seed weight measured prior to seeding was 0.28 g/1000 seeds. The germination percentage (81.8%) was determined in a growth chamber at alternating temperatures of 15/25°C with 12 h of light and 12 h of darkness (Baskin & Baskin, 2014). The germination percentage was in line with what was reported by Caser et al. (2022), while the weight of 1000 seeds was higher (0.28 g). Before seeding, the soil was ploughed and harrowed by a tractor (Lamborghini R70). According to Giandon and Bortolami (2007) and Horneck et al. (2011), the availability of nitrogen and phosphorous in the soil was medium, while potassium was available at high concentration; thereby, no fertilizers were applied during the experiment, neither as a basal application nor as top dressing. During the entire experimental period, plots were kept weed free by manually removing weeds. Irrigation was applied only when plants showed significant symptoms of drought stress.

Two seeding rates, 0.14 g m^{-2} (low) and 0.55 g m^{-2} (high), and two harvest regimes (early and delayed) were tested. Since no information is available on the optimum seeding rate for this species and use, we considered the seeding densities reported for bunching and processing spinach by Simko et al. (2014) (860–990 seeds m^{-2}) and adopted lower and higher densities. A similar study by Scarici et al. (2018) used 1085 seeds m^{-2} of *Picris hieracioides* for a field experiment, which is in line with our seeding rates.

Based on the specific seed weight and germination percentage, the low seeding rate (0.14 g m^{-2}) corresponded to 500 seeds m^{-2} and 408 plants m^{-2}, while the high seeding rate (0.55 g m^{-2}) corresponded to 1962 seeds m^{-2} and 1604 plants m^{-2}.

The experiment followed a randomized complete block design with three replications, and the plot size was 1.12 m^2

TABLE 1 Cut dates of dandelion in 2022 at the “Po di Tramontana” experimental center (Rosolina, Italy) under early and delayed harvest regimes.

Harvest	Cut			
	First	Second	Third	Fourth
Early	May 27	June 15	August 12	October 10
Delayed	June 4	June 23	August 19	October 17

(0.75 m × 1.5 m). Plots were harvested when fully extended leaves reached a length of 20 cm (early harvest) and 1 week later (delayed harvest) (Table 1). The early harvest was determined by measuring the length of the leaves of eight plants per plot using a rule. The plants in all plots were hand cut at 3 cm above ground level using grass-cutting scissors, with a total of four cuts made per harvest regime (Table 1).

At each harvest, three test areas (30 cm × 20 cm) were randomly selected in each plot, and the number of plants and leaves were counted to calculate the number of plants per square meter (plant density), the number of leaves per square meter (leaf density), and the number of leaves per plant. The leaves in the test areas were collected and weighed to determine the total leaf fresh weight (LFW) using a precision balance and the leaf area index (LAI) using an LI-3100C Area Meter (Ecosearch Srl). The leaves were then oven-dried at 65˚C for 48 h to calculate leaf dry weight (LDW, mg leaf^{-1}) and specific leaf weight (SLW, g cm^{-2}). The LFW yield, that is, the LFW of the entire plot, was determined by adding the LFW of the test area to the LFW of the remainder of the plot. The total LFW yield (g m^{-2} year^{-1}) was obtained by summing up the yields of all the cuts. The leaf nitrate content was then determined by spectrophotometry using the salicylic-sulfuric acid method (Ferrante et al., 2003).

An analysis of variance was performed using a linear mixed-effect model to test the effects of seeding rate, cut, harvest regime, and their interactions on the number of plants square meter, the number of leaves per plant, LAI, LDW, SLW, LFW yield, and nitrate content. The same linear mixed-effect model was used to test the effects of seeding rate and harvest regime and their interaction on total LFW yield. Data were transformed to ensure normality and homoscedasticity of the residuals, then back transformed to obtain the final results. Significant differences among means were identified by a least significant difference test with Bonferroni correction at a probability of 0.05. All statistical analyses were performed in R version 4.0.2 (R Core Team) as well as the “nlme” package for fitting mixed models and “multcomp” for post hoc comparisons.

3 | RESULTS

Nitrate content was the only parameter significantly affected by the interaction between harvest regime, cut, and seeding rate (Table 2). The interaction between seeding rate and harvest regime significantly affected plant density and LDW, while the interaction between cut and harvest regime affected LFW yield, plant height, LAI, LDW, and SLW (Table 2). The interaction between seeding rate and cut affected LFW yield, plant height, leaf density, and number of leaves per plant (Table 2). Considering the main effects, plant density, number of leaves per square meter and per plant, LDW, and leaf nitrogen contents were significantly affected by the seeding rate. Furthermore, a significant effect of cut was found for plant height, leaf density, and number of leaves per plant, while harvest affected LFW yield, plant height, LAI, LDW, and SLW. Total LFW yield was not significantly affected by seeding rate or harvest regime, or their interaction.

The interaction between seeding rate and cut (Figure 4) showed that at both seeding rates, the highest LFW yield was obtained at the second cut, while the lowest was obtained at the fourth cut. The first and third cuts had intermediate values. However, although the yield was better at the first cut than at the third at the high seeding rate, the yields were similar at the low seeding rate (Figure 4). In the early harvest, the LFW yields at the first and fourth cuts were significantly lower than at the second cut (Figure 4). In contrast, in the delayed harvest regime, the yield at the fourth cut was significantly lower than at all the other cuts with the exception of the third cut, and not significantly different from the first and fourth cuts in the early harvest. Differences in LFW yield between the early and delayed harvests were observed only at the first cut (Figure 4).

At both seeding rates, the highest plant heights were reached at the first two cuts (Figure 4), but they were higher when seeded at the high than at the low seeding rate. Furthermore, the highest plant heights were reached at the second cut in the early harvest and at the first cut in the delayed harvest (Figure 4). While there were no differences between the other cuts in the early harvest regime, plant height at the second cut was significantly higher than at the third and fourth cuts in the delayed harvest regime.

As expected, plots seeded at the high rate had a greater plant density (plant m^{-2}) than those seeded at the low rate (309 vs. 135). There was no difference between the harvest regimes at the high seeding rate, but at the low seeding rate, we found a significantly lower plant density in the delayed harvest regime (Figure 5). Plant density at the first cut (300 plant m^{-2}) was significantly higher than at the third (177) and fourth (200) cuts, but not at the second cut (210) (data not shown).

The highest LDW was found at the low seeding rate in the delayed harvest (Figure 5), and no differences were observed among the other values.

The number of leaves per plant was generally higher in the plots seeded at the low seeding rate (Figure 6). At the high seeding rate, the fewest leaves per plant were found at the fourth cut, while at both seeding rates, the most were found at the third cut. Comparing harvest regimes, there were 8.15

TABLE 2 Results of the analysis of variance on the effect of seeding rate (SR), cut (C), harvest regime (H), and their interactions on leaf fresh weight (LFW) yield, total LFW yield, plant height, plant density (number of plants per square meter), leaf density (number of leaves per square meter), leaf area index (LAI), number of leaves plant per plant, leaf dry weight (LDW), specific leaf weight (SLW), and leaf nitrate content.

Measured variable	SR	C	H	SR × H	C × H	SR × C	H × SR × C
LFW yield	ns	ns	**	ns	*	*	ns
Total LFW yield	ns	–	ns	ns	–	–	–
Plant height	ns	***	***	ns	**	***	ns
Number of plants per square meter	***	ns	ns	*	ns	ns	ns
Number of leaves per square meter	***	*	ns	ns	ns	*	ns
Number of leaves plant per plant	***	*	ns	ns	ns	**	ns
LAI	ns	ns	***	ns	**	ns	ns
LDW	*	***	***	**	*	ns	ns
SLW	ns	ns	**	ns	**	ns	ns
Leaf nitrate content	ns	***	ns	ns	ns	*	*

Significant *F* test at *$p = 0.05$, **$p = 0.01$, ***$p = 0.001$; ns, nonsignificant.

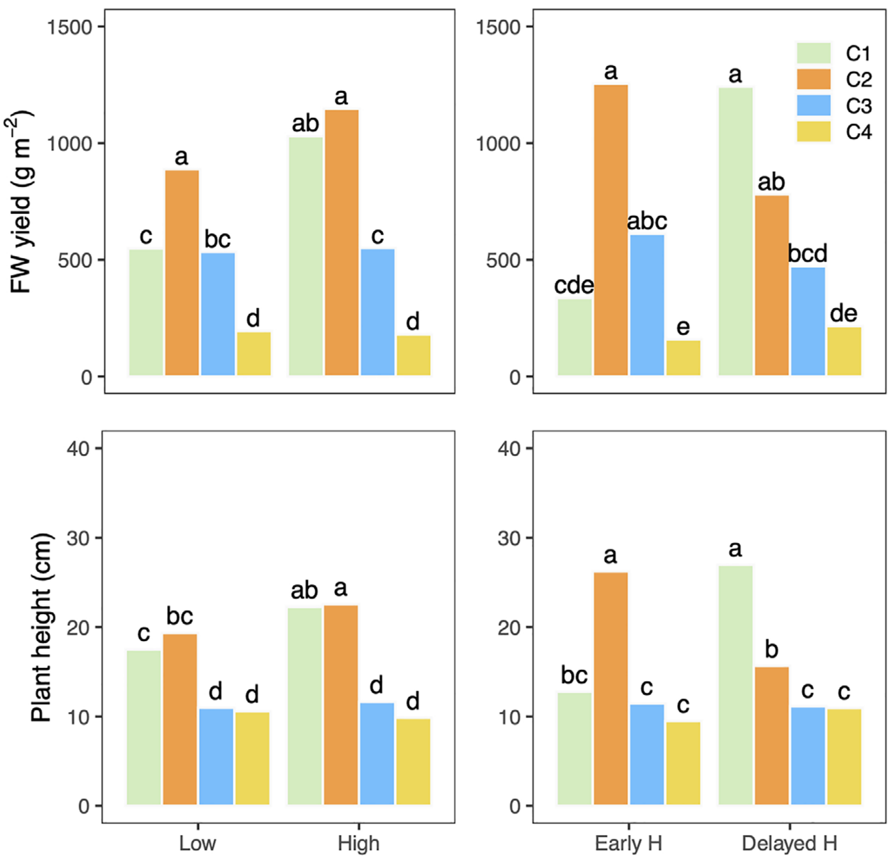

FIGURE 4 Leaf fresh weight (LFW) yield and plant height of dandelion according to cut and harvest regime (on the right) and cut and seeding rate (on the left). Bars with the same letters are not significantly different at the 0.05 probability level. Delayed H, delayed harvest; Early H, early harvest; High, high seeding rate; Low, low seeding rate; C1–C4 = first to fourth cut.

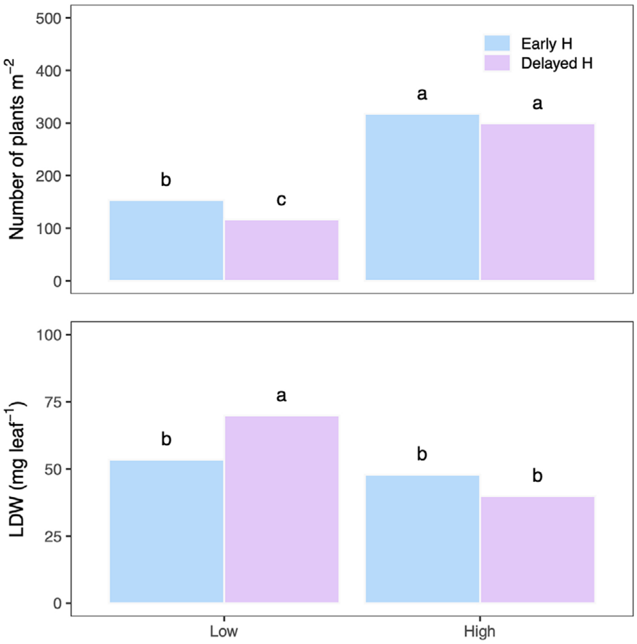

FIGURE 5 Number of plants per unit of surface and leaf dry weight of dandelion according to seeding rate (low and high) and harvest regime (early harvest [early H] and delayed harvest [delayed H]). Bars with the same letters are not significantly different at the 0.05 probability level.

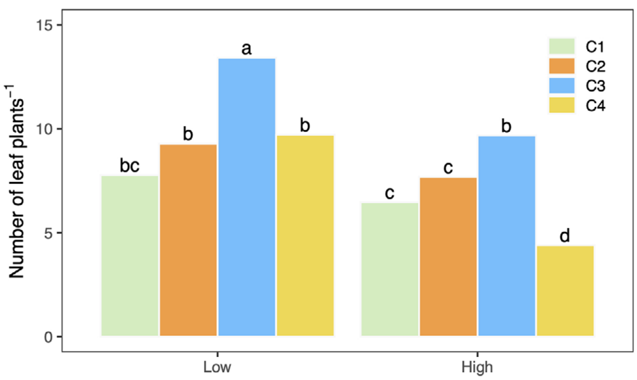

FIGURE 6 Number of leaves per dandelion plant according to seeding rate (low and high) and cut (C1–C4). Bars with the same letters are not significantly different at the 0.05 probability level.

leaves per plant in the early harvest, and 8.96 in the delayed harvest (data not shown).

The LAI at the first and second cuts in the delayed harvest regime was higher than at the third and fourth cuts, while in the early harvest, the LAI at the first cut was lower than at the second and was not significantly different from the LAI at the third cut (Figure 7). The fourth cut exhibited the lowest LAI in both the early and delayed harvest regimes.

In the early harvest regime, the highest LDW was at the second cut, followed by the third cut, and then by the first and fourth cuts, which did not differ significantly from each

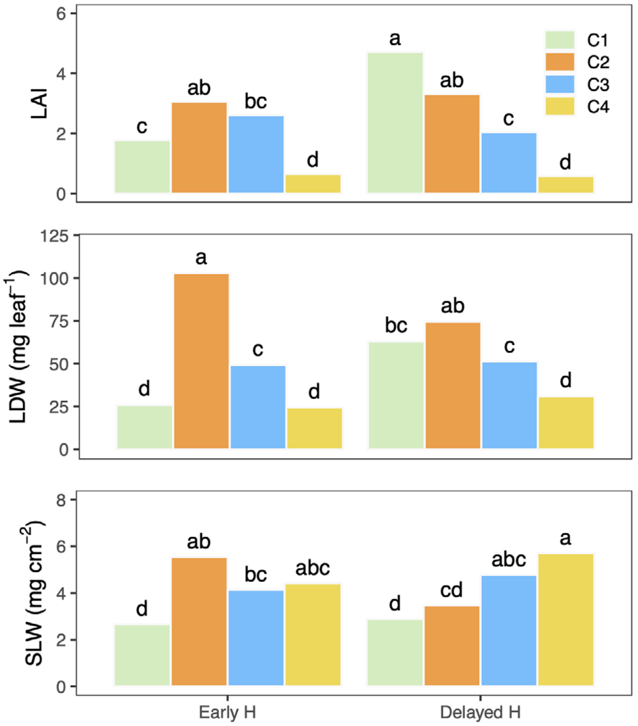

FIGURE 7 Leaf area index (LAI), leaf dry weight (LDW), and specific leaf weight (SLW) of dandelion according to harvest regime and cut. Bars with the same letters are not significantly different at the 0.05 probability level. Delayed H, delayed harvest; Early H, early harvest; C1–C4 = first to fourth cut.

other (Figure 7). The lowest LDW in the delayed harvest regime was at the fourth cut, and the highest was at the second cut, although no significant differences occurred between the second and first cuts.

The lowest SLW in the early harvest regime was at the first cut, and there were no statistically significant differences between the other cuts, whereas in the delayed harvest regime SLW progressively increased from the first to fourth cut.

The three-way interaction between harvest regime, seeding rate, and cut showed the fourth cut to have the lowest leaf nitrate content in all cases, although the difference between the fourth and third cuts was not statistically significant (Figure 8). The first and second cuts had the highest values, the only exception being the first cut in the early harvest regime at the high seeding rate.

4 | DISCUSSION

When comparing the LFW yield of the two seeding rates, the only significant difference was found at the first cut when plants were young, and the higher stand density resulted in higher yield. No significant differences were detected at the subsequent cuts between the two seeding rates, presumably

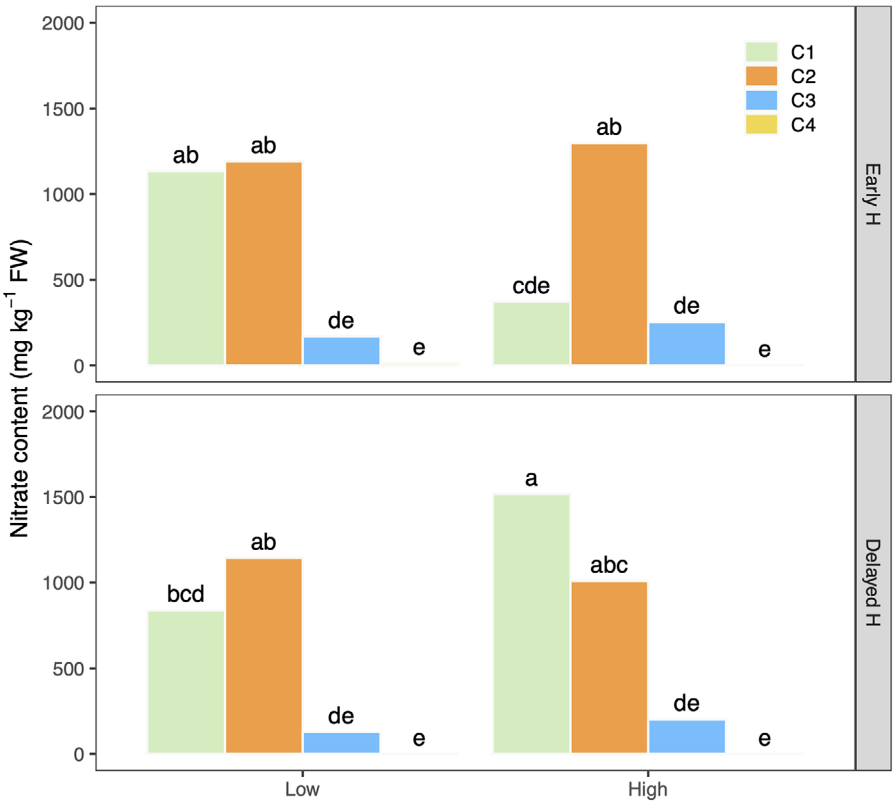

FIGURE 8 Nitrate content in dandelion leaves according to the interaction of cut, harvest regime, and seeding rate. Bars with the same letters are not significantly different at the 0.05 probability level. Delayed H, delayed harvest; Early H, early harvest; C1–C4 = first to fourth cut.

due to plant growth and maturation. LFW yield is expected to increase with the increasing plant density (Anaclerio et al., 2021; Ciriello et al., 2021; Zanin et al., 2009), but this is not always the case, as the specific density also plays a role (Zanin et al., 2009) as do plant competition and adaptation. In fact, higher plant density is often associated with fewer leaves per plant, which was our finding in other studies (Zanin et al., 2009; Anaclerio et al., 2021; Ciriello et al., 2021; Maboko, 2013). This, together with a lower LDW, can explain the lack of a significant increase in LFW yield.

Our data also showed fewer plants in plots seeded at the low rate (0.14 g m^{-2}) under the delayed than under the early harvest regime. This suggests that at the low seeding rate, delaying harvest increased the competition among plants, resulting in a lower stand density. At the high seeding rate, there was a constant decline in the number of plants as the cuts progressed, which could be attributed to the mortality of some plants due to defoliation stress (i.e., frequent cuts) or, more generally, to greater intraspecific competition, sometimes referred to as self-thinning (van der Werf et al., 1995). At the lower seeding rate, however, there was a greater number of leaves per plant, which can be attributed to reduced competition. Comparing the two seeding rates (0.14 and 0.55 g m^{-2}), we found that plant height at the first and second cuts was higher at the high seeding rate than at the low seeding rate. This result may be accounted for by the lower plant density at the low seeding rate, which favors a more prostrate growth habit, or by the lower availability of light, in particular a reduction in red to far-red radiation, causing leaf expansion (Meng et al., 2019). However, this difference was not observed between the third and fourth cuts, possibly because of reduced plant growth due to the high temperatures and low precipitation during this growing period (Figures 1 and 2). Thus, the seeding rate of 0.14 g m^{-2} resulted in fewer plants per square meter, but a higher dry weight per leaf.

The difference in LFW yield at the first cut between the early and delayed harvests is related to the short growing period between seeding and the first cut in the early harvest regime. It is interesting that once the plots were established, no differences between the harvest regimes were found. Furthermore, LFW yield decreased with increasing cuts with significant differences between the first and fourth cuts, probably due to climatic conditions being inadequate to ensure proper growth (Figure 4).

The lower values for plant height, LAI, SLW, and LDW at the first cut in the early harvest compared with the delayed harvest can be linked to the poor stand level achieved in the period between seeding and the first cut.

The nitrate content found in the present study varied between 14.4 and 1517.1 mg kg^{-1} LFW. These values are in line with those resulting from a survey carried out on 23 samples by EFSA (2008), which found nitrate contents ranging from 5 to 2747 mg kg^{-1} (5th and 95th percentiles), or those reported by Gorenjak et al. (2012), which ranged from 47 to 487 mg kg^{-1}. Maximum dandelion nitrate content is not regulated by law, but these values might raise some concerns as they fall within the middle (500–1000 mg kg^{-1}) or even high (1000–2500 mg kg^{-1}) levels of acceptable nitrate content (Santamaria, 2006). However, it should be noted that although young dandelion leaves can be consumed raw in salad, they are more often consumed after cooking, boiling in particular (Bielińska & Kołodziej, 2009; Türkmen et al., 2023; Zuin et al., 2015), a highly relevant consideration as the boiling process considerably decreases the nitrate content, as reported by, for instance, Prasad and Chetty (2008) and Leszczyńska et al. (2009).

Our data also show that at the third and fourth cuts, nitrate contents were greatly reduced. This pattern is in contrast with the expected response to season and cut. In fact, due to lower light availability in the autumn growing cycle, the nitrate content is higher than in spring (Kołota et al., 2010; Salehzadeh et al., 2020; Tabagl et al., 2020), while the opposite is rarely the case (see Yanjun et al. 2016). Likewise, nitrates were generally found to increase with successive cuts (Ciriello et al., 2021; Puccinelli et al., 2021, 2023). In addition, nitrate content is expected to be reduced as a result of greater light availability when plant densities are low, as found by Scuderi et al. (2009) for lettuce and Ciriello et al. (2021) for basil. However, this is not always the case; see, for example, Gonnella et al. (2002) for lettuce, Fontana and Nicola (2009) for corn salad (*Valerianella olitoria* L.) and rocket, and Anaclerio et al. (2021) for prickly golden fleece [*Urospermum picroides* (L.) Scop. ex F.W. Schmid]. It has to be remembered that the plots were not fertilized, and this might affect both the average leaf nitrate concentrations and its pattern in the consecutive cuts.

5 | CONCLUSIONS

The performance of dandelion in high-density cultivation is promising and shows the potential of this plant to be intensively cultivated as a food crop. However, the results of our study highlighted some issues that need to be addressed in greater detail by further studies. First, the seeding rate did not affect the productivity of dandelion, despite the great difference in plant density between the seeding rates of 0.14 and 0.55 g m^{-2}; it would therefore be interesting to test lower seeding rates. Furthermore, we found no substantial differences in LFW yield between harvest regimes, hence no indication as to which would be better for commercial production. Differences between harvest regimes in morphological parameters, such as plant height, LAI, SLW, and LW, found at the first cut indicate slow growth in the early stages of dandelion plants. It would therefore seem reasonable to delay the first cut to maximize leaf yield, but this would not be justified at the subsequent cuts; when the plants have reached maturity, since at these stages, the early and delayed harvests had similar yields. The varying leaf nitrate content of dandelion according to season and cut is another issue that merits further investigation, in particular in association with fertilization.

AUTHOR CONTRIBUTIONS

Elena Basso: Data curation; formal analysis; investigation; software; visualization; writing—original draft. **Cristina Pornaro**: Data curation; formal analysis; software; visualization; writing—review and editing. **Giampaolo Zanin**: Conceptualization; methodology; writing—review and editing. **Michele Giannini**: Conceptualization; funding acquisition; project administration; resources; supervision; writing—review and editing. **Stefano Macolino**: Conceptualization; funding acquisition; project administration; resources; supervision; validation; writing—review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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