BIOGOLF PROGRAM
the "Golf della Montecchia Case study" – Padova (Italy)

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Golf della Montecchia is located in Padova (Italy) near the Abano hot springs region and on the edge of the Euganean Hills Park protected area. For many years, the golf course has been managed with a focus on environmental sustainability, as reflected by the numerous environmental awards that the golf club has received at both the national and international levels: the "Committed to Green" national award in 2007 and 2012, the "Golf Environmental Organization" environmental certification since 2013 and nomination for the "IAGTO Environmental Awards" in 2014.

This was possible in part thanks to the club's partnership with the Green Section of the Italian Golf Federation and the Universities of Pisa, Turin, Bologna, Rome and Padua, with which they have conducted studies as well as direct applications on the golf course, involving the wild fauna and flora, the tree heritage, CO_2 emissions and turfgrass.

Golf della Montecchia landscape

The most significant results come from the adaptability tests on warm-season species above the 45th parallel, which led to the conversion of the tees and fairways from cool-season grasses to Bermudagrass in 2010. This application – the first at these latitudes – cut water consumption by 70%, the use of fertilizers by 80% and the elimination of pesticides. Thanks to this experience, numerous golf courses across Italy have started or are about to begin conversion programs to establish Bermudagrass on their tees and fairways. Golf Montecchia have also established partnerships with Spanish and Portuguese Superintendents and Agronomists to examine the possibility to introduce Bermudagrass in areas where cool-season grasses are traditionally used.

In light of the recent introduction of European Directive 2009/128/EC requiring a drastic reduction in the use of pesticides, Golf della Montecchia is now working on developing the **"Biogolf"** project. This program is truly innovative in the way it manages sport turfgrasses and was launched at the behest of the Sport Credit Institute, the Green Section of the Italian Golf Federation, the Golf Environmental Organization and major Italian environmental organizations (Legambiente, Federparchi and Fondazione Univerde).
Since January 2015, the third nine holes at Golf della Montecchia, called the "Yellow Course", have been managed according to "Biogolf" protocol criteria requiring turfgrass management according to organic farming principles: maximum application of correct agronomic practices, use of organic fertilizers only, no use of pesticides and identification of tolerance thresholds. We describe the ongoing study below.

Current situation

The third nine holes of Golf della Montecchia, called the "Yellow Course", were built in 1992. The flora composition is as follows:

Original planting 1992 – Evolutions over the years

	Original seeding - 1992	Evolution over the years	Present turf (since 2012)
Greens & collars	*Agrostis stolonifera* cv. Pennlinks	*Agrostis stolonifera* cv. Pennlink, *Poa annua*	*Agrostis stolonifera* cv. Pennlinks, *Poa annua*
Green surrounds	*Poa pratensis, Lolium perenne, Festuca rubra*	*Lolium perenne, Poa annua, Agrostis stolonifera, Cynodon dactylon*	*Lolium perenne, Poa annua, Agrostis stolonifera, Cynodon dactylon*
Tees	*Poa pratensis, Lolium perenne, Festuca rubra*	*Lolium perenne, Poa annua, Agrostis stolonifera, Cynodon dactylon*	*Cynodon dactylon x transvaalensis* cv. Patriot
Fairways	*Poa pratensis, Lolium perenne, Festuca rubra*	*Lolium perenne, Poa annua, Agrostis stolonifera, Cynodon dactylon* , some broad leaves	*Cynodon dactylon x transvaalensis* cv. Patriot
Semirough & rough	*Poa pratensis, Lolium perenne, Festuca rubra, Festuca arundinacea*	*Poa pratensis, Lolium perenne, Festuca rubra, Festuca arundinacea, Cynodon dactylon, Paspalum spp.* , some broad leaves	*Poa pratensis, Lolium perenne, Festuca rubra, Festuca arundinacea, Cynodon dactylon, Paspalum spp* ., some broad leaves

Through the organic management begun in January 2015, there were re-detected the following problems:

- Greens: *Sclerotinia homeocarpa* (Dollar spot) and *Digitaria spp.* difficult to manage. *Rhizoctonia spp.* and *Gryllotalpa gryllotalpa* are a minor problem, although present
- Collars: infestation of *Digitaria spp*. and *Eleusine indica*
- Edges of bunkers and pathways: weeds management
- Rough: management of broadleaf weeds

Solutions

Alternative techniques under study to limit weeds

- **Management of bunkers edges:**

- comparison of flame weed control, pelargonic acid + maleic hydrazide and manual cleaning
- comparison of edge management through the introduction of *Z. matrella* cv. Zeon and manual cleaning

- **Rough:**

- Plans to evaluate the use of a harrow

- **Pathways:**

- comparison of flame weed control and pelargonic acid + maleic hydrazide.

Alterative techniques under study to control weeds and diseases on greens and collars

To address these problems, in the summer 2016 it was decided to convert the greens from *Agrostis stolonifera* to Bermudagrass, in particular *Cynodon dactylon x transvaalensis* cv. Miniverde.

This cultivar has been under study since 2012 on one of Golf della Montecchia's pitching greens.
Pre-rooted plants were planted on the greens, while the collars and green surrounds were converted to *Cynodon dactylon x transvaalensis* cv. Patriot using the fairways and tee score cultivation residues.

All of these tests are being monitored by the Universities of Bologna, Pisa and Turin, as well as by the Green Section of the Italian Golf Federation in order to not only conduct a technical-economic and environmental analysis of the case study, but also to evaluate the golf course in terms of quality and use.

There are previous examples of golf courses managed without use of pesticide; this protocol differs from the others because one of its objectives is also to guarantee good playability and aesthetic value.

To ensure the reliability of results, the study will continue until at least 2020.

Z. matrella cv. Zeon for edge management

Comparison of flame weed control, pelargonic acid + maleic hydrazide

Golf della Montecchia landscape