Transition from cool-season to warm-season grass: environmental effects in a golf course in the North of Italy

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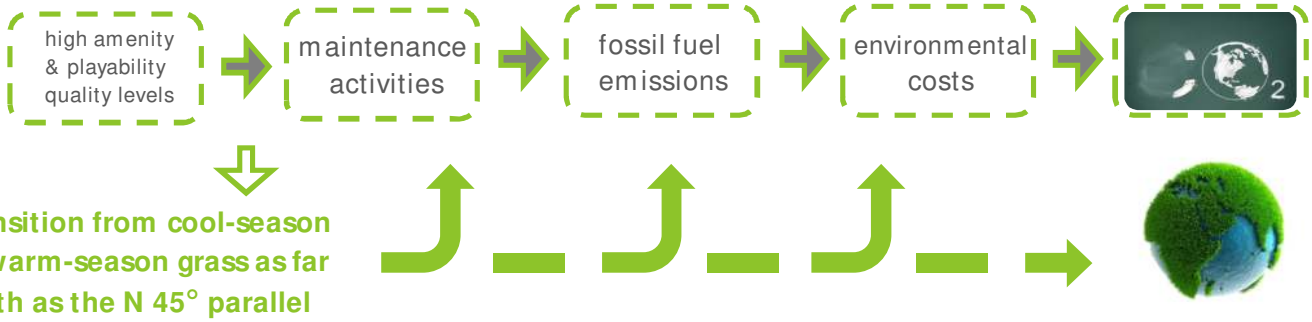
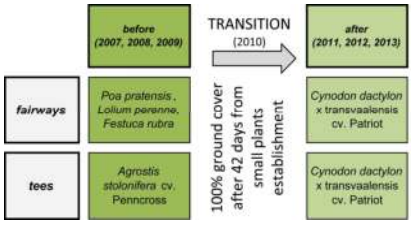


Transition timing

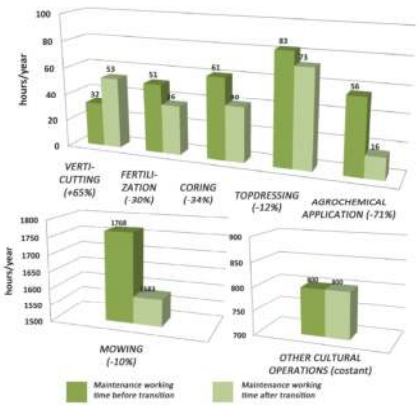


Engine working time for tees and fairways

Cultural operation	tees + fairways (before transition)	tees + fairways (after transition)	delta (%) before-after	cultural operation effect (%)*
mowing	688	503	-27%	75%
verticutting	12	33	+172%	-8%
fertilization	29	13	-53%	6%
coring	41	20	-50%	8%
topdressing	49	39	-20%	4%
pesticides application	40	0	-100%	16%
total + 10%**	945	670	-29%	100%

Engine working time (hours per year) spent for cultural operation on tees and fairways (9 holes) before and after 2010 (average of the 3 years). * indicates effect of the cultural operation on the reduction of maintenance due to the transition. ** indicates unexpected operations (+10%).

Annual amount of the maintenance working times in the whole surface of the 9 holes



Annual amount (average of 3 years) of the maintenance working times in the whole surface of the 9 holes. In brackets the delta (%) for each cultural operations between the amount of hours before and after transition.

introduction >> Despite the environmental benefits, also turfgrass has ecological costs related to the greenhouse gases emissions involved in the maintenance operations. The adoption of new approaches may assure a more sustainable management, without renouncing to high amenity and playability quality standards. In the last decade some studies demonstrated the adaptability of warm-season grasses to the Italian climate, as far north as the N 45° parallel.

The use of warm-season grasses reshape the maintenance activities while reducing water consumption, fertilizer inputs, pesticides application, and the frequency of the interventions.

The reduction of machinery working time implies less CO_2 emissions from fuel combustion, according to the EU policies (IPCC, 2013).

aim >> The goal of this study is to assess the environmental effects of two different maintenance approaches in 9 holes of Golf della Montecchia, Padua (Italy).

results >> The annual amount of hours spent in tee and fairways reduced almost 30% after 2010. Bermudagrass demonstrated an excellent adaptation and confirmed to require fewer inputs than most cool-season turf, according to the former studies effectuated at the same latitudes.

Despite tees and fairways represent only 16% of the surface, their influence after transition on the amount of hours of maintenance was appreciable (-8%). Mowing represented the activity with higher reduction of hours, -185 hours/year.

conclusion >> The transition from cool-season to warm-season grass permitted a more environment friendly maintenance. The study confirmed that warm-season grass requires fewer input (N, pesticides and water) and less hours of work, reducing CO_2 emissions from machinery fuel combustion. Despite the climate of the North of Italy, *Cynodon dactylon* x transvaalensis cv Patriot demonstrated an excellent resistance to thermal limits and a good wear tolerance.