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Conversion of a degraded urban area to golf-school course in central Italy

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Key words : urban rehabilitation ,turf mixtures ,specific contribution

Introduction Degraded industrial areas cause problems of pollution that are dangerous especially in urban and suburban areas . The high costs of excavation and removal of contaminated waste materials tend to ensure that these areas are left unattended in many regions of the world , including some in Europe . An illegal dump of such materials was identified in Florence between 1985 and 2000 , with wastes from the building industry (such as bricks , cement components , tails) and the home hardware industry (mainly old fridges , washing machines , etc .) . This degraded area became apparent due to a nearby housing development . Rehabilitated began in 2001 by a private company , and the entire area was converted into a golf-school course . This was a high cost effective approach with good long term results .The expansion of green areas such as golf courses can help to improve the quality of life in many big cities (Volterrani and Magni , 2004) .

Materials and methods The industrial wastes , over 3 ha , were covered , with 25-35 cm of clayey soil (clay 40% , silt 35% , sand 25%) derived from construction areas . The soils were levelled , harrowed and planted in July 2001 . Mineral fertilizer with 120-120-120 kg ha⁻¹ of N-P₂O₅-K₂O was applied each year . The plant mixtures comprised : 30% *Poa pratensis* "Moonlight" ; 20% *P. pratensis* "Brilliant" ; 20% *Lolium perenne* "Citation Fore" ; *Festuca rubra* spp . *Trycophilla* "Seabreeze" ; 15% *F. rubra* spp . *Commutata* "Ombretta" . Irrigation was applied at 3 to 4.8 mm per day according to rainfall and temperatures of the previous day . The grass was cut when it reached 3 cm , in order to keep turf height at 2.5 cm . The establishment of the sward was very good and sport activities have continued since September 2001 . The botanical composition was analysed from 2003 to 2007 .

Results and discussion Six years after planting (August 2007) , the turf continued in a dense state (table 1) , and oversowing was necessary only in small patches mostly due to water logging . The average cover in 2007 was 97.5% and the specific contributions of the sown species (95.8%) remained balanced , with *Lolium perenne* as the most persistent (37.5) . Traffic and walking activities , however , were controlled , and this facilitated the continued good turf conditions on this high clay soil . Thanks to the presence of little walking and consequently reduced soil compaction .

Table 1 Specific contribution of the sown species , weeds and bare soil in august 2007 .

	Specific contribution and bare soil (%)	
<i>Lolium perenne</i>	37.5	a
<i>Poa pratensis</i>	29.0	b
<i>Festuca rubra</i>	29.3	b
Other (weeds)	1.7	c
Bare soil	1.6	c

Conclusions The quality of the turf has persisted well over 6 years , regardless of the poor soil texture , This is probably possible because walking and soil compaction were limited in a school course . The setting of the area was cheap and the establishment very good also from the point of view of the beauty of the sward . The incomes of the enterprise will eventually be reinvested to change the soil and seed again if soil compaction will affect the turf negatively . This cheap technique can be proposed for easy and quick rehabilitation of degraded urban and suburban areas , however more species should be tested . In Mediterranean areas , these should include warm season grasses that can help to reduce water needs .

References

Volterrani , M . , Magni S . , 2004 . Species and growing media for sports turfs in Mediterranean area . 1st International Conference on Turfgrass Management and Science for Sports Fields . Ed . P . A . Nektarios . *Acta Hort* . 661 :359-364 .