1. INTRODUCTION

- Cherry orchard design is lately changed, due to the introduction on the market of new size-controlling rootstocks, such as those belonging to German series GiSeL A®.
- Adopting those genotypes has provided the potential for developing high-density planting (HDP) in sweet cherry (Hroško, 2010; Lugli and Musacchi, 2010).
- Several planting systems have been testing for different cherry orchard model around the world (Hroško, 2005; Lauri, 2003, Negueroles Perez, 2005, Long, 2010).
- In Italy, new training systems have been recently developed for HDP sweet cherry: the intensive V-system and Super Spindle Axis (SSA) (Musacchi et al., 2012).
- In both training systems, trees crop mainly on basal floral buds of 1-year-old shoots. Those shoots are tipped back to 15-20 cm of length during winter pruning (Fig. 1).

2. MATERIAL AND METHODS

Location: Ferrara province (Northeast Italy).

Training systems (Fig. 2): A) the spindle has been developed by selecting four wide-angle lateral shoots to establish a permanent scaffold of branches; B) trees trained to V-system have been planted alternately at about 20° angle down from one side to other side of inter-row spacing; C) the Super Spindle Axis (SSA) has a permanent vertical leader along which many short bearing branches are uniformly distributed.

Rootstocks and cvs: GiSeL A® 6 with Giorgia and Grace Star®; GiSeL A® 5 with Early Bīg®, Early Star®, Sweet Early®, Sylvia, Grace Star®, Black Star®, Summit, Kordia, Ferrovia and Regina. The harvest dates in 2011 for each cultivar are reported in Table 1.

Trial features: planting year 2007. Planting densities range from 1,905 to 5,714 trees/ha depending on rootstock-training system combinations (Tab. 2).

Orchard managements: whole orchard is covered by anti-hail net, while anti-cracking net is not present; micro-irrigation system is used for irrigation and fertirrigation.

Measurements (from 2007 to 2012):
- trunk diameter at 10 cm above the graft union to calculate the trunk cross-sectional area (TCSA).
- weight of winter pruned wood.
- number of fruits and yield per tree.
- fruit size on a representative sampling of 1 kg per plot.

3. RESULTS

- The spindle system produced more winter pruned wood per tree. However, the V-system and SSA collected a higher cumulative weight of winter pruned wood per hectare, although values were statistically different only for GiSeL A® 5 (Fig. 3).
- The cultivars Grace Star and Black Star had the highest cumulative weights of winter pruned wood (Fig. 3) and the largest TCSA (Fig. 4), confirming their high vigor trait.
- Trees trained to spindle registered a higher TCSA (26.2 cm²) than those trained to V-system and SSA (respectively 21.8 and 20.2 cm²) with GiSeL A® 5 (Fig. 4).
- In 2012, the SSA system with both rootstocks collected the highest yield per hectare (6.04 and 11.5 t/ha respectively with GiSeL A® 5 and GiSeL A® 6) (data not shown).
- Among cultivars grafted on GiSeL A® 5, Grace Star resulted the most productive in 2012; yields were 12.9 t/ha with V-system, 12.2 t/ha with SSA and 7.8 t/ha with spindle (Fig. 5).

4. CONCLUSIONS

- The high-density training systems, as V-system and SSA, resulted suitable for developing a pedestrian sweet cherry orchard.
- GiSeL A® 5 rootstock highlighted a strong vigor reduction.
- The SSA planting system induced an earlier bearing than V-system and spindle.
- Yield performance of cultivars was affected by inherent traits of bearing habit; in particular, the fertility of floral buds in the basal part of 1-year-old shoots had a strong influence.
- In this trial, Ferrovia emerged as the most interesting cultivar for HDP orchard; in fact, it produced the highest cumulated yield, reporting every year, high percentage of cherries into >28 mm size class.