



NOVATERRA. REDUCING NEGATIVE IMPACTS OF PESTICIDES AND FERTILIZER APPLICATIONS UNDER INTEGRATED VINEYARD MANAGEMENT

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OBJECTIVE and SCOPE

NOVATERRA aims to significantly reduce the use and negative impacts of contentious plant protection products for integrated pest, disease and weed management in two of the main Mediterranean crops in Europe, **grapevines** and olive trees. NOVATERRA is led by the *Institut de Recerca i Tecnologia Agroalimentàries* (IRTA), which will work until the end of 2024 with other 22 entities from 6 European countries: Spain, Portugal, France, Italy, Greece and Belgium. This EU project comprises novel strategies in 6 working packages, among them, **Alternative products** (WP2) and **Soil management** (WP4) have been developed in field trials, for establishing integrated sustainable strategies. Given the current EU framework with its last claims and directives (soil strategy 2030, green claims directive, CSRD, etc.), is important to limit or reduce the use of inputs in agricultural production. Downy mildew (*Plasmopara viticola*) is one of the major grapevine diseases and, the main cause of copper application in vineyards. Reducing fertilizers, and notably the Nitrogen fertilization in vineyards is one of the current challenges in European viticulture. For WP2, one trial has been developed during 2022 and 2023 in the Terras Gauda S.A. vineyards: 20 years old in cv. Albariño, conducted in horizontal trellis (3,5 m x 2,5 m), located at O Rosal (Pontevedra, NW Spain) under Atlantic climate (Cfb, T^a.14.6°C; P 1,587 mm; annual average) and sandy loam soil. For WP4, one trial was conducted in vineyards located in Aster (Burgos, Central Northern Spain) vineyards: 32 years old in cv. Tempranillo, conducted in trellis (2,5 m x 1,3 m), under Mediterranean climate (Csb, T^a 11.6 °C; R 435 mm; annual average) and loamy sand soil. Additionally, for WP4 one trial was also conducted (2021-2022) in the Terras Gauda vineyards.

Alternative Products (WP2) Downy mildew

2022-23. Trials in Terras Gauda were carried out in small plots with 4 replicates for each one: untreated or control, commercial treatment (COS-OGA) and for bio solution (BIOCNTN JDE01; 0015; 0079 and AXP12). The treatment interval was 7-10 days from ten separated leaves (53 BBCH) to berries pea size (75 BBCH). First assessments (at high pressure; 60% incidence) in 2022, showed promising results (incidence and severity on bunches) with BIO CNTR 0079, after 4 applications at mid-flowering stage (Fig 1). In 2023, with an incidence of 15% and a severity of 8% at BBCH 79 stage, the BIO-CNTR-079 had an efficacy of 33% (Figure 2) and, after 6 copper treatments (mixed strategy; Figure 3), efficacy on bunches was interesting in comparison with the standard treatment. Therefore, a correct efficiency of biosolution with only 3 applications in the pre-flowering period (when disease pressure is not high) is possible (Picture 1).

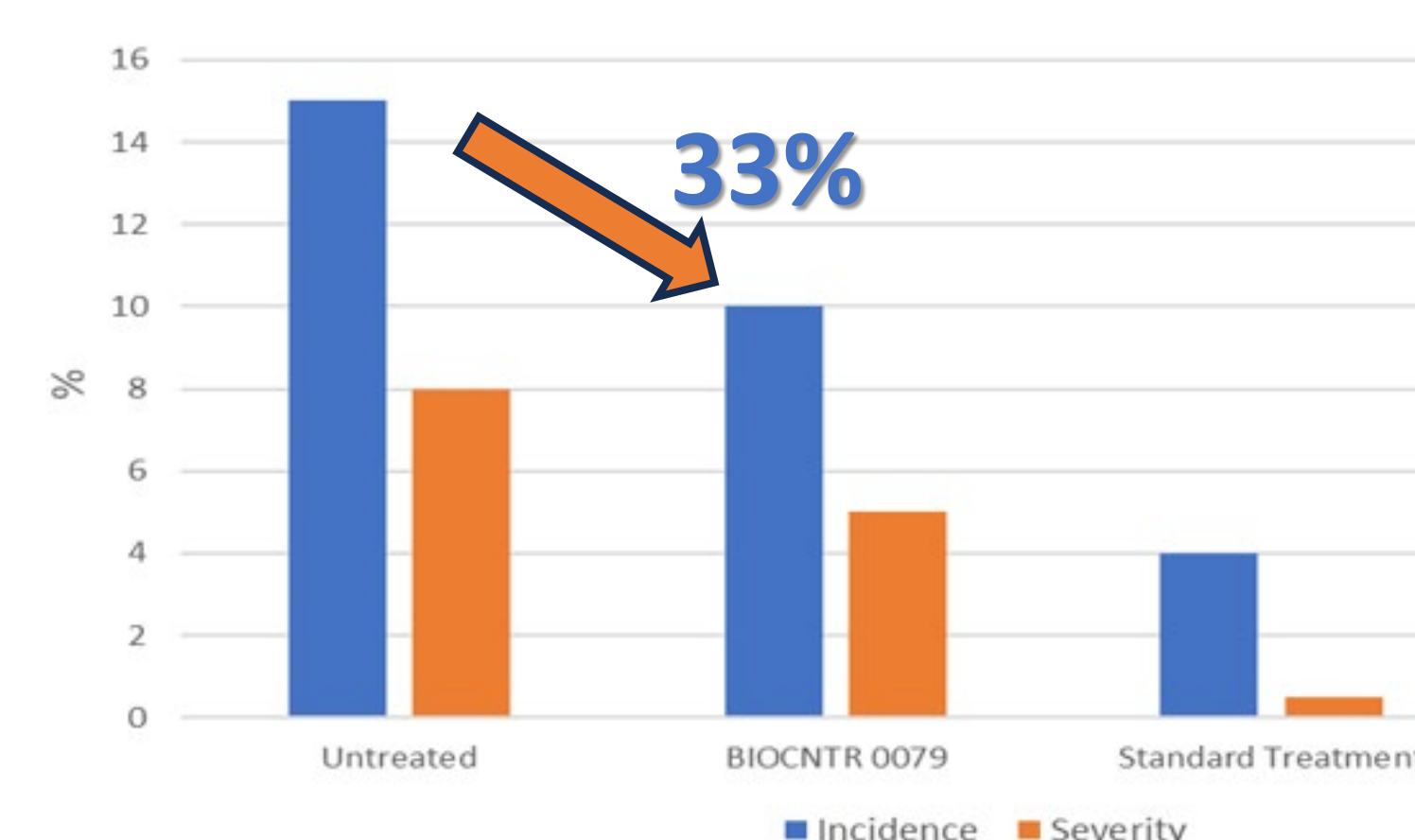


Fig 2. 2023. Incidence and severity on bunches (79-81 BBCH).

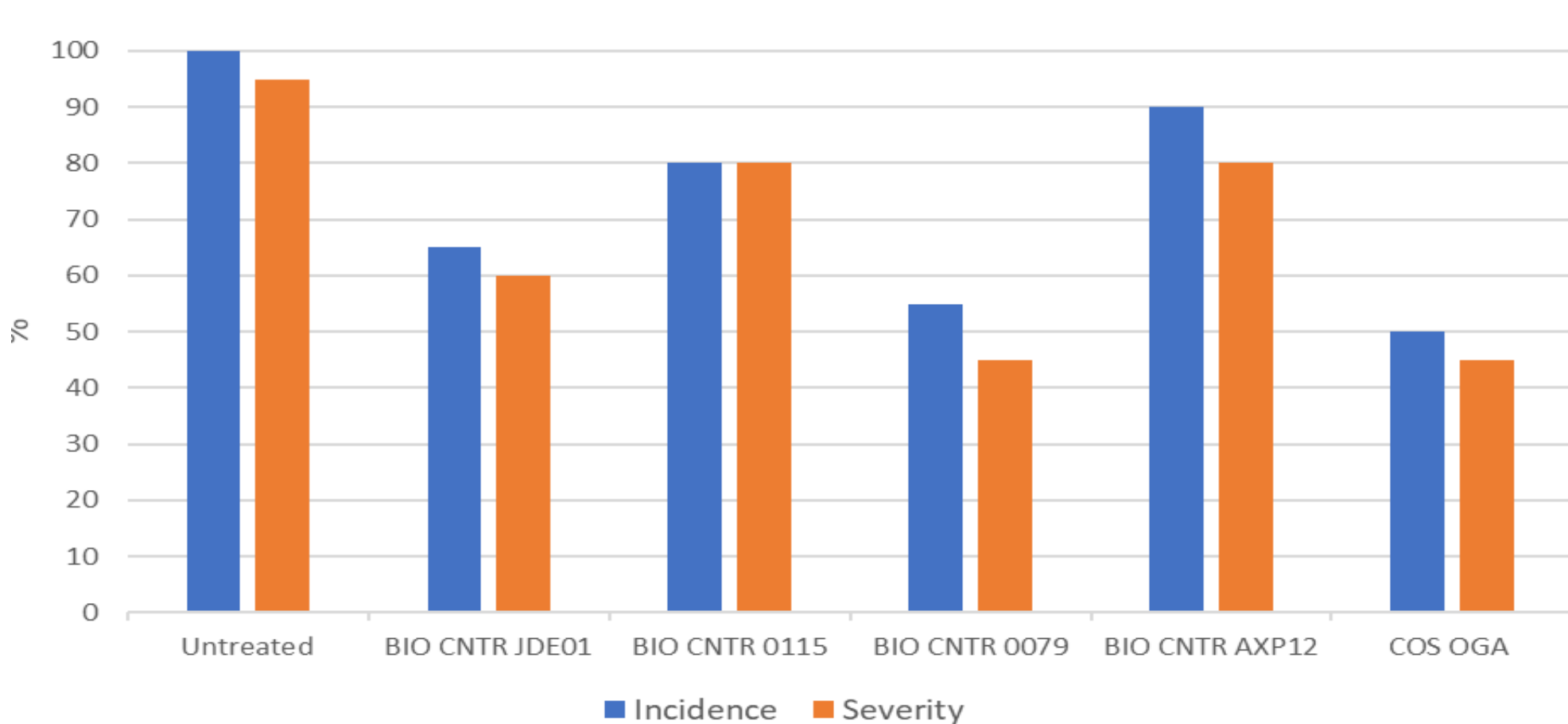


Fig 1. 2022 Incidence and severity on bunches (75-77 BBCH).



Picture 1. Damage on berries and bunches for treatments (79-81 BBCH).

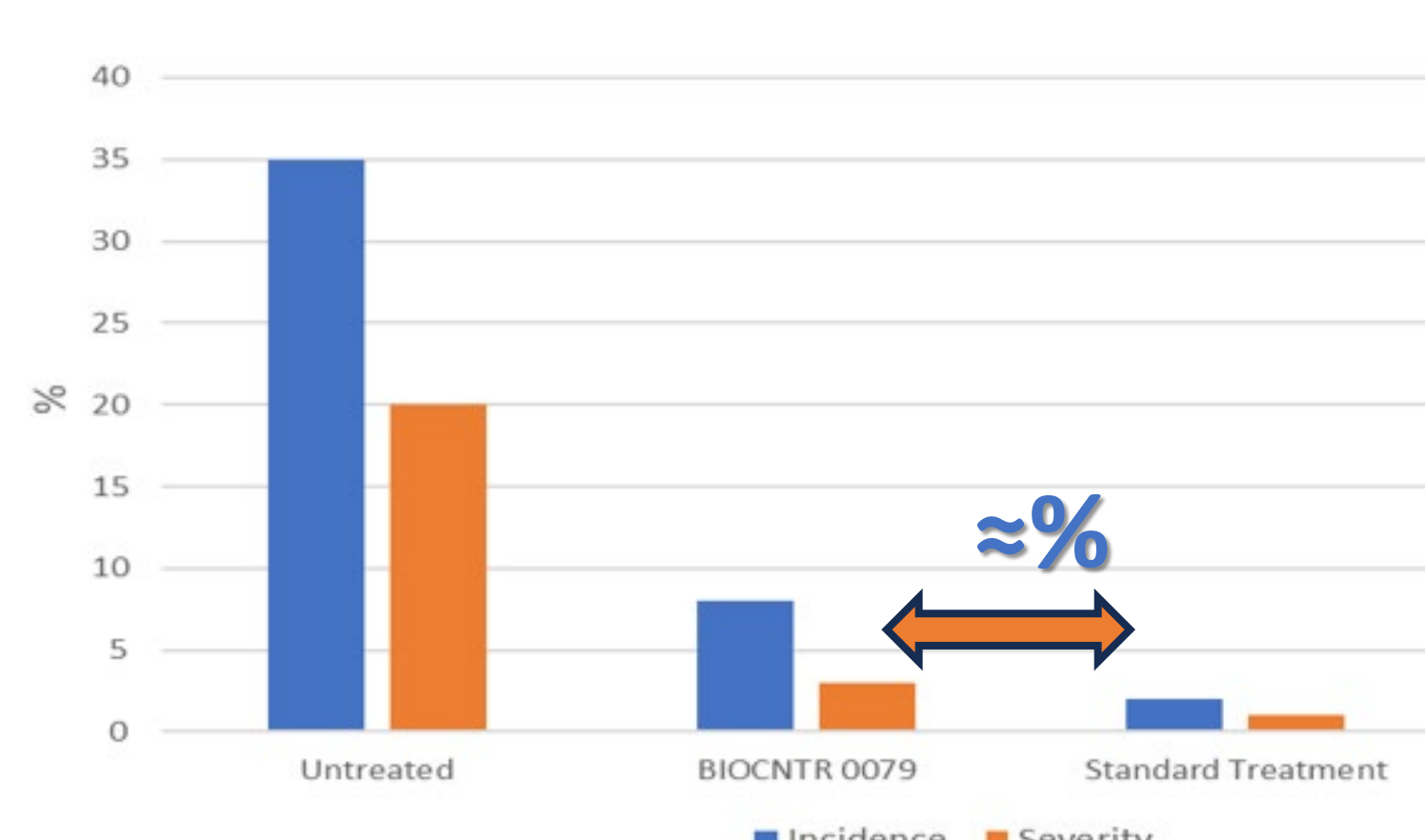


Fig 3. Incidence and severity on bunches (79-81 BBCH).

Soil management (WP4) Reducing N

Reduction in N inputs is based in the use of Instinct[®], a product based in Optinyte[™] technology, that uses nitrapyrin as N stabilizer in soils. Trials were carried out in small plots with 4 replicates for each one: control without fertilization (CT), inorganic fertilization (IF), reduced fertilization (-30%N) with Instinct[®] (OP30) at a dose of 1 L/ha, and reduced fertilization (-40%N) with Instinct[®] at the same application rate plus a biostimulant (OP40BIO). Yield (kg/plant), pruning weight (kg/plant) and Ravaz index, were measured for three years (2021-2023), keeping both vineyards (Aster and Terras Gauda) other commercial parameters (vigor, phytotoxicity, yield, must quality parameters, etc.) under control.

In Aster vineyards (2021-2022-2023; Fig4), no significant differences between treatments were found in the fertilization trials due to the high production variability obtained. However, the trend observed in OP30 treatment, which got higher production (kg/plant) than the complete inorganic fertilization besides a 30% reduction in N fertilization (Aster vineyards), which means that a better Nitrogen Use Efficiency (NUE) is obtained. Same trend was observed in Terras Gauda trial in 2021 (kg/plant - CF: 1.84; IF: 2.49; OPO30: 2.59; OPO40BIO: 2.9; n.s.) and 2022 (kg/plant: CF: 2.55^b; IF: 3.45^a; OPO30: 3.96^a; OPO40BIO: 3.55^a; P= 0.05; Tukey test).

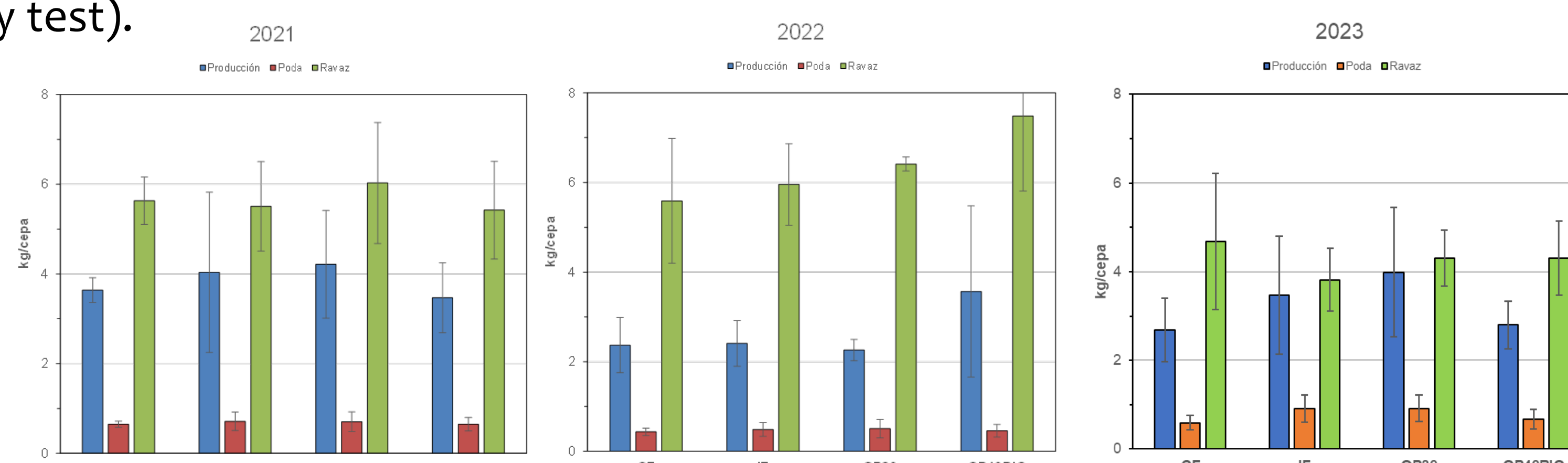


Fig 4. Aster trial (UBU). Yield (kg), pruning weight (kg) and Ravaz index for 2021 2022, and 2023 respectively

CONCLUSIONS

Biosolutions showed a low control (less than 20%) and no efficacy at high disease pressure (60%incidence/55% severity). Nevertheless, promising results for partial copper replacement have been shown when applied at low disease pressure for downy mildew control (pre-flowering period), which helps to delay the pathogen attack. The biosolutions tested are not enough to totally replace copper.

A 30-40% reduction in N fertilization is possible without losing yield (kg/plant) or quality when using Instinct[®]. This is an important result as the stabilization of N in the form of ammonium is retained in the soil exchange complex, being available for the crop during all the production cycle.