

THE EFFECTS OF AMELIORATIVE TILLAGE APPLIED IN COMPLEX ON YIELDS IN „CROVUL” LACU SARAT, BRAILA

VALENTINA COTEȚ, SORINA DUMITRU, VICTORIA MOCANU,
M. EFTENE, DANIELA DANA, IULIA ANTON

National Research and Development Institute for Soil Science, Agrochemistry and
Environmental Protection of Bucharest

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Abstract

The management of saline soils requires a combination of agricultural practices depending of the atent investigations of soil characteristics, water quality and local conditions including climate, crops, economical, social, political, and cultural conditions of the environment, as well as the existent farm systems. There is not a single way to control the salinity, especially for irrigations.

The main ameliorative measures taken into account are the drainage, levelling and shaping for applying removing salts watering, the ammendation (usually, in Romania is used the phosphogypsum – a rezidual product from phosphorus nutrients plants), the levigation, the deep loosening (with or without soil material inverting), ameliorative organic or/and mineral fertilization, mulcing, the selection of crop tolerant to salinity and alcalinity, crop rotation, etc.

Yield results for the 4 studied crops in field for agricultural years: 1998 – 1999, 1999 – 2000, 2002 – 2003, 2003 – 2004 are presented as a comparison with the benckmark variant = 100, identified as the variante with the minimmum ameliorative practices (only chemical fertilization, tillage using paraplaw and amendation), due to the lack of a real benckmark variant (without ameliorative interventions).

To highlight the whole effect of ameliorative practices applied in different fields variants, the obtained yields are presented as absolut values, as well as relative values (% from the benckmark variant = V8a).

INTRODUCTION

By applying the amelioration technics for saline soils, these are diminishing continuous the soluble salts content and the percent of exchangeable natrium, therefore they evolve to unsaline soils [3]. They are still sensible to salinity process, therefore, if the amelioration or prevention technology is not followed, or if the maintenance of draining-drainage network, these soils become relatively fast saline soils again.

MATERIAL AND METHODS

The field researches have been done on saline chernozems (weak to strong) from Braila Plain, in a depressionary area. The natural conditions, including the soils from the experimental field, have been presented in two precedent papers [1,2].

In this paper, the effects of ameliorative practices on yields are presented and discussed.

To highlight the effect of ameliorative practices on yields for main crops, the yields for agricultural years 1998–1999, 1999–2000, 2002–2003, 2003–2004 are presented in comparison to benchmark variant = 100, which is subject to fewer ameliorative practices (only chemical fertilization, soil tillage with paraplaw and amendment), due to the lack of a real benchmark variant (without ameliorative interventions).

The ameliorative practices on each treatment variant are the following:

V1 - Drainage with 20 m between drain lines + Deep loosening + Ameliorative irrigation + Organic fertilization + Chemical fertilization + Plough without soil material inverting + Amendment.

V2 - Drainage with 20 m between drain lines + Deep loosening + Ameliorative irrigation + Chemical fertilization + Plough without soil material inverting + Amendment.

V3 - Drainage with 20 m between drain lines + Deep loosening + Ameliorative irrigation + Chemical Fertilization + Plough with soil material inverting + Amendment.

V4 - Drainage with 20 m between drain lines + Ameliorative irrigation + Chemical fertilization + Plough without soil material inverting + Amendment.

V5 - Drainage with 20 m between drain lines + Deep loosening + Chemical fertilization + Plough without soil material inverting + Amendment.

V6 - Drainage with 20 m between drain lines + Deep loosening + Chemical fertilization + Plough without soil material inverting + Mulcure + Amendment.

V7 - Drainage with 40 m between drain lines + Deep loosening + Ameliorative irrigation + Chemical fertilization + Plough without soil material inverting + Amendment.

V8 - Without drainage + Deep loosening + Ameliorative irrigation + Chemical fertilization + Plough without soil material inverting + Amendment.

V8a - Without drainage + Chemical fertilization + Plough with soil material inverting + Amendment.

RESULTS AND DISCUSSION

To highlight the whole effect of applied ameliorative measures in the various technological variants from the experimental fields, the yields have been discussed in absolute and relative values (% from the benchmark variant = V8a).

For the first variant (V1) with most ameliorative works, the increase yields are very larger, from 115 – 208% (yields 215 – 308%), except the sorghum, the wheat and the maize green matter, where the increases are only 50 – 56%. Sunflower had a relatively constant yield in the 4 studied years between 215 – 253%.

In the second variant (V2), quite similar to the foregoing variant, but without organic fertilization, there are yields increases between 43 – 157% except the sorghum and the wheat where the increases are 19 – 54%. One has also to notice that sunflower yields are closely, being in a range of 205 – 241%, different to V1 with about 10 – 12%, the differences that could be determined by the application of the organic fertilizers.

For the third variant (V3), where soil tillage uses paraplaw (without soil material inverting), the increase yields are between 18 – 111%, with noting that the largest increases appear to sunflower, with yields between 198 – 208%.

In the fourth variant (V4), without organic fertilizers and deep loosening, the increase yields are between 53 – 132%, excepting the sorghum, wheat and maize green matter in one year, with yields increases of only 18 – 47%.

In the fifth variant (V5), due to the lack of ameliorative irrigation, the yields increases are between 39 – 141%, except the sorghum and the wheat where the increases are only 26 – 46%. The sunflower yield are between 185 – 214%.

For the sixth variant (V6), the yields vary between 72 – 107%, except the sorghum, wheat and maize green matter in a year with increase yields of 16 – 25%. The sunflower yields are between 175 – 207%.

In the seventh variant (V7), the moderat drainage leads to yields increases of 15 – 80%, for the sunflower the yields varying between 135 – 180%, and for maize between 139 – 163%.

For the eighth variant (V8) (without drainage + deep loosening + ameliorative irrigation + chemical fertilization + soil tillage with soil material inverting + amendment), the increase yields are smaller, between 2 – 55%, but for the sunflower the yields are larger, between 105 – 155%, while for the maize the yields being between 124 – 132%.

CONCLUSIONS

After the ameliorative measures applied in complex, one can conclude that:

1. The yields increase continuously with the intensification of the drainage from weak (without drainage $D = 0$ m) to moderat ($D = 40$ m) and intensively ($D = 20$ m).
2. The yields are also influenced by ameliorative irrigation, with pozitiv effects especially for sunflower, sudan grass and maize green matter; but with no significant effects for sorghum and wheat.
3. On the other hand, the lack of deep loosening, the paraplaw plough and mulcing, lead to small yields increases (insignificant).
4. The variant with organic fertilization has the larger increase of yileds for all studied crops and for all studied years.

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