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Reuse of dredged streambed sediments in agricultural fields: soil quality and weed risk assessment

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Many intensively cultivated areas suffer from soil losses, due to accelerated soil erosion processes, which eventually deposit in the stream channel. To prevent flood risks, the deposited sediments are routinely dredged from the streambed, and due to the lack of a cost-effective solution, piled upon the stream bank. Dredged sediments (DS) piles may disturb the ecological balance in the riparian habitat, serve as a reservoir for weed seeds and may enable the further establishment of invasive species. Studies have shown that DS tend to be richer in organic matter and plant nutrients compared to the adjacent local soil, thus DS might be used as amendments to agricultural fields. However, the seedbank in DS may contain harmful weed species that threaten farmers from applying this valuable soil. The main objective of the current study is to assess the quality of DS as an agronomic substrate and its potential risk for weed invasion and establishment in the agricultural environment in case of applying DS in agricultural fields. DS that were piled (0.6-1.2 m height) on the eastern bank of Nahalal stream (Jezre'el Valley, northern Israel) were sampled along the bank, from a section of 1 km in 10 transects at three depths (top, middle, bottom). The upper (0-20 cm) soil layer at the adjacent agricultural field (AF) was sampled in parallel to the DS transects and along the hillslope Catena. Soil properties analyses was conducted in order to assess the soil quality of DS compared with AF. The soil seedbank was recorded for DS and AF samples using a germination assay. Preliminary results shows that the quality of DS can fit agronomic requirements. However, a trend of increased species richness and seed density was observed in the DS compared with the AF samples. Future analysis will include the calculation of a soil quality index and a Weed Risk Factor in order to assess the potential risk of reusing DS in agricultural fields.