The “Big Bang” in the Early Iron Age: Charred Crop Storages and Agriculture of the Iron Age Settlement Gradina upon Bosut in Syrmia

Aleksandar Medović · Aleksandar Mikić

Summary: The Early Iron Age granaries of Tell Gradina upon Bosut exploded in a fire inferno in the 8th century B.C. The result of this catastrophe is a 2-5 cm thick layer with mixed carbonized seeds and fruits. Recently, eight samples were taken from Gradina’s profile for archaeobotanical analysis. The goal was to obtain basic information on land use and major crops and weeds of that period. The most abundant were cereals, followed by millets, pulses and oil/fibre plants. The dominant cereals were einkorn (Triticum monococcum) and hulled barley (Hordeum vulgare vulgare). Broomcorn millet (Panicum miliaceum) was also very important. Pulses were represented with six and oil/fibre plants with three species. Among weeds and ruderals, most common are rye brome (Bromus secalinus), fat hen (Chenopodium album), darnel ryegrass (Lolium temulentum), hairy crabgrass (Digitaria sanguinalis) and corncockle (Agrostemma githago).

Key words: archaeobotany, burnt layer, Early Iron Age, sampling, Syrmia, Tell Gradina upon Bosut

Introduction

Catastrophes in which whole settlements were burnt down and entire crop reserves exploded were quite common in the past. Archaeobotanical sampling of carbonized plant remains through the entire burnt layer of an archaeological site differs from usual archaeobotanical work. It requires less work onsite and disproportionally more work offsite. Therefore, the answer to “when is enough?” can be very helpful. If our goal is to reveal major cultivated plants and weeds, then we need to analyze 10-20 samples per burnt layer. Tell Gradina upon Bosut with its up to 4 m thick Early Iron Age layers in Syrmia (Serbia) is from an archaeobotanical point of view one big lost chance. Twenty years after excavations had ended, we were able to collect only eight samples from the eldest building horizon at site’s profile. Could we “correct the past”? Is there enough material to say which crops were cultivated and which were the major weeds?

Plant seeds and fruits have different chances of getting carbonized in standard archaeological contexts. The term “carbonization” is widely used in archaeology and archaeobotany to describe the most common mode of survival of archaeological plant remains. Carbonization occurs upon exposure to high temperatures due to fire. Such heating, under a limited supply of oxygen, converts the plant’s organic compounds into charcoal. Since charcoal is not affected by bacteria, fungi, or other decomposing organisms, the carbonized plant remains survive in most environments for centuries. Because of everyday activities and practices in archaeological settlements, some plants are more likely to get in contact with fire than others, e.g. some of them need to be roasted or cooked before eating. Consequently, they have more chances of accidental carbonizing. Differences in this matter exist even within one plant-group. Glume cereals need to be dehusked before consumed. Dehusking is aided if grains are dry, and this is sometimes affected by exposure to fire (parching). Free-threshing cereals are mostly underrepresented in the usual archaeological record because parching is not required for separating grains from their husks. But, if whole settlements catch fire, all seeds and fruits obtain equal opportunity to get in contact with it. The “only” things that could affect their carbonization are differences in their chemical composition, consistency and texture (thickness of the seed coat, moisture content), their amount and size, temperature height, etc. It is needless to mention that after successful carbonization, seeds and fruits should be recovered during archaeological excavations.
in the way which can provide realistic picture of either human diet in ancient times, or reveal past subsistence strategies, or make contribution to the history of plant domestication, or just to give an overview of main crops and their weeds in a specific moment of time in one settlement.

Materials and Methods

Is it possible for a settlement to “explode”? Amount of cereal-grains (barley, wheat, rye, triticale) that can produce heat energy equivalent to 1 litre of fuel oil is 2.1-1.8 kg. But, one needs only 1.4-1.3 kg of oil plant seeds to achieve the same effect. Therefore, archaeological settlements could be seen as time bombs. A retired archaeology professor from Berlin is an eyewitness of Dresden bombardment from 1945. He still remembers the explosions and “lightshow” coming from the faraway grain silos hours after air raid. Similar examples happen today as well. For instance, a silo in Sečanj, near Zrenjanin, full of sunflower seed that was inadequately dried and managed, exploded in December 2003, with devastating effects since the heat potential of sunflower oil is equal to that of petrol (Radmilo 2005).

Gradina upon Bosut is a multi-period Tell in Syrmia, Serbia. Its Early Iron Age layers are up to 4 m thick. The eldest building horizon, Bosut IV a (Kalakača Culture, ca. 850-750 B.C.) ended in a big fire inferno with exploding grain storages. Witness of this catastrophe is a 2-5 cm thick layer of charred seeds and fruits, which is still visible in Gradina’s profile. Twenty years after archaeological research, only eight samples could be recovered from the layer for archaeobotanical analysis. The samples (350 ml soil each) cover 24 m range in more or less equal intervals. Is there enough material to say which crops were cultivated and which were the major weeds? After Medović (2004) one needs ten to twenty samples for this to find out. If we also want to record rare weeds, we need up to 50 samples.

Results and Discussion

A total of 63 plant taxa could be identified from 24,260 recovered charred plant items (Medović, in press). On average, one sample contained 7.88

---

Graph 1. Horizontal mapping of the weight of cereals, millets and weeds in the burnt Early Iron Age layer of Gradina upon Bosut

Grafikon 1. Horizontalna distribucija koncentracija žitarica, prosa i korovsko-ruderalnih biljaka u ugljenisanom sloju starijeg gvozdenog doba sa Gradine na Bosutu
different plant taxa. Among seed remains, the most abundant were crops. Eight different cereals, two millets, three oil/fibre plants and even six different pulses were identified. Only three cereals (einkorn, barley and broomcorn millet) exceeded the number of one thousand records. Among pulses, the most dominant was lentil (*Lens culinaris* Medik.), followed by cultivated grass pea (*Lathyrus sativus* L.) and bitter vetch (*Vicia ervilia* (L.) Willd.). The weeds and synanthropic vegetation, including ruderals, were represented by 35 taxa. Most common were rye brome, fat hen, darnel ryegrass, hairy crabgrass and corncockle. The amount of weeds was rather small and varied from 0.42% to 4.21% (average 2.16%). Although the percentages by weight of oil/fibre plant remains was 0.01%, their frequencies (found in 7 of 8 samples) indicate much higher significance of gold-of-pleasure, opium poppy (*Papaver somniferum* L.) and flax (*Linum usitatissimum* L.) in diet/"manufacture" of Iron Age inhabitants of Gradina.

Lately, much effort has been made in understanding processes of carbonization (Braadbaart et al. 2004, Braadbaart 2008, Guarino & Sciarrillo 2004, Märkle & Rösch 2008. Some results of those experiments were striking: cereal grains show a lower resistance to high temperatures, whereas pulses become completely carbonized at higher temperatures. While reducing conditions usually enlarge the temperature range at which seeds carbonize without getting destroyed, broomcorn millet (*Panicum miliaceum*) behaves exactly the opposite way. The chances of carbonization for *Linum usitatissimum* are quite good. And some results were expected: *Papaver somniferum* has only very little chance of becoming carbonized at all, because the temperature range at which this happens is very small. Could this information be somehow applied in the case of Gradina upon Bosut? There are too many unknown variables and too much chaos caused by explosion for this information to be used. Nevertheless, a horizontal mapping of the weight of crops reveal that pulses concentrate to the right side and that the cereals have their peak in the middle of the investigated layer.

Weight proportions of crop assemblages found in the material are 85.41% (cereals) : 13.94% (millets) : 0.65% (pulses) : 0% (oil/fibre plants). The ranking of crops changes only for millets and cereals if we compare the number of

Graph 2. Horizontal mapping of the weight of pulses in the burnt Early Iron Age layer of Gradina upon Bosut

Grafikon 2. Horizontalna distribucija koncentracija variva u ugljenisanom sloju starijeg gvozdenog doba sa Gradine na Bosutu
recorded items 46.55% (cereals) : 52.75 (millets) : 0.61 (pulses) : 0.09 (oil/fibre plants). Are these proportions in accordance with real conditions before the moment the catastrophe occurred? We cannot know. But, according to results of archaeobotanical analysis of remarkably preserved human faeces from the Iron Age salt mine on the Dürrnberg Mountain near Hallein/Austria (Boenke 2005), our proportions fit almost perfectly. The miners’ diet was dominated by cultivated plants and based mainly on cereals. Pulses and oil plants were far less important. These results may change our idea that pulses and oil plants were underrepresented in archaeobotanical record.

Conclusions

With only eight archaeobotanical samples from one burnt layer of Tell Gradina upon Bosut, valuable information was obtained on land cultivation in Early Iron Age in Syrmia: Inhabitants cultivated several cereals, millets and even six pulse crops. They also grew two oil plants and one oil/fibre plant. Major weeds in the assemblages were determined, and concentration of crops in the layer was also tracked. These results confirm the statement that one needs only ten samples from burnt layer of a settlement to gain basic information on its land use.

References


