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Hulled wheats in Spain: history of minor cereals

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For millennia, hulled wheats (einkorn, emmer and spelt) have been cultivated in Spain. Isolated in mountain areas, small pockets of hulled wheats associated with traditional agriculture have survived. These are the last examples of our highly threatened crop genetic and cultural heritage. We present an overview of the history of these three minor crops; archaeobotanical and ethnographic data are provided in order to understand the role of these crops during past and present times.

Introduction

The evolution of agriculture in Spain during the last thirty years has led to the retreat and final collapse of traditional agriculture. Although Spanish agriculture is mostly mechanized, nevertheless, pockets of land under traditional farming systems survived to the present. In these areas, it is still possible to find crops which, while never cultivated at large scale, have played an important role within the economies of many rural areas until very recently. Generally, these are old crops with a long history of use, that continue to be cultivated in marginal areas largely due to traditional factors and a host of other reasons. Despite the vagueness of the term "minor" (D'Antuono et al., 1993), it, generally, refers to crops cultivated at a small scale, with very little, if any, inputs. Amongst them, the present-day cultivated hulled wheats (*Triticum monococcum* L., *T. dicoccum* (Schrank) Schübl and *T. spelta* L.) are of special importance. They, as most minor crops, have been neglected by both policy makers and researchers.

Our interest in hulled wheats stems from the need to provide archaeology

with an ethnographic framework in which to study and interpret plant remains from archaeological contexts. In 1981, G. Hillman published a paper on the reconstruction of crop husbandry practices from charred remains of crops in which he established the bases of the so-called "ethnographic models" (see also Hillman 1981, 1984a, 1984b). His work in Turkey showed that in non-mechanized societies most crop processing activities could be done in a relatively few efficient methods. On the other hand, he was able to observe and measure the effects of agricultural operations (e.g. harvesting, sieving, etc.) on the composition of crop products and by-products. His observations and analyses led him to suggest that:

> "if, in present-day cultivation of prehistoric crop types, a particular feature of the composition of crop products (or by-products) can be demonstrated to result exclusively from the use of a defined operation or sequence of operations then, given a closely similar archaeological sample of plant remains, it can be suggested that these remains were the product of essentially similar operations or sequences of operations that may have been used in the prehistoric context".
>
> (Hillman 1981, pp. 126-127)

The existence of small pockets of land where hulled wheat cultivation was associated with traditional agricultural practices, offered the possibility of undertaking a series of ethnographic studies as a basis for a better understanding of prehistoric agriculture in Spain.

This paper examines the evolution of hulled wheats from prehistoric to modern times in Spain. An attempt was made to understand the effects of ethnobotany on the distribution, cultivation, processing and use of these minor wheats.

Methods

Over a four year period (1991-1994), field work was carried out in mountain areas of Spain (Andalucía and Asturias) where three species of hulled wheats were still under cultivation (Peña-Chocarro, 1993;1995;1996). During this period several, accessions were collected and distributed to several genebanks in Europe for conservation. At the same time, a large body of data and information were compiled, covering agronomic practices, crop processing sequence, and uses. It was possible to observe and document the day-to-day activities of farmer families and report on these activities in relation to hulled wheat management, production etc. At a later stage (1994-1995), and during two different seasons of field work, it was possible to collect new information

hitherto unknown on the cultivation of *T. dicoccum* in Navarra (Peña-Chocarro and Zapata Peña, 1997), however, we realized that emmer wheat cultivation already disappeared from this region, therefore, we relied on collected data from farming families through a questionnaire.

Hulled wheats in Spain: from prehistoric to modern times

The archaeobotanical record

It is difficult to reconstruct the role of hulled wheats during prehistoric times. Research into archaeobotany is still scarce and unevenly distributed throughout the Iberian Peninsula. However, investigations carried out during the last 15 years allow to throw some light on the subject. Contrary to what seems to be the case in eastern and central Europe and the Near East, in western Europe, particularly in the Iberian Peninsula, hulled wheats do not seem to have played such an important role within the local economies (Buxó i Capdevila 1997, Peña-Chocarro, 1995).

The earliest record of einkorn and emmer goes back to the early Neolithic at Cova de l'Or in Valencia (Hopf ,1966) and Cova de les Cendres in Alicante (Buxó i Capdevila, 1997). By the sixth and fifth millennia (B.C.), sites in the Mediterranean coast as well as in Andalucía revealed the presence of a full productive economy involving the cultivation of einkorn, emmer as well as bread wheat and barley. Afterwards, einkorn appeared only occasionally and, in many cases, only a single grain was recovered (Buxó i Capdevila et al., 1997). Overtime, however, the importance of emmer gradually decreased but the species never disappeared totally (Buxó i Capdevila et al., 1997).

Despite the abundance of data on spelt cultivation in central and northern Europe, little is known about its appearance in Spain. Caro Baroja (1972) suggests that spelt was introduced by the Romans although there is an earlier example dating back to the Iberic period (Intxur in Cubero, 1994). The two rare examples, dating back to the Iberic and Roman periods and found in the northern part of the Iberian Peninsula (Basque Country and Galicia), consist of both grains and chaff (see Buxó i Capdevila, 1997). Clearly, the lack of evidence on spelt cultivation is due to the absence of archaeobotanical research in later periods, i.e. Roman, and Medieval.

Methods for recovery plant remains are seldom used in excavations dated to historic times resulting in the absence of evidence for these later periods. In fact, the believe that once there is written documentation bioarchaeological studies are not longer needed has implied that our knowledge on the appearance and cultivation of spelt is very poor. Nevertheless, we hope that future work will

improve our knowledge of hulled wheats during protohistoric and Roman times.

The Medieval Period

Most, if not all, of the information known on hulled wheats during the Middle Ages comes from written sources, both Christian and Muslim. The first concerns monastic documents, civil contracts, laws, etc. which contain valuable insights into agriculture. Thus, the Cronicón Albendense (833 AD) contains the first reference to emmer/spelt indicating that the Asturian “escanda” (generic name for both emmer and spelt) was one of the well-known products of Spain. The second refers to the agronomic Andalusi legacy which includes several Arab Treatises which provide ample evidence for the existence of hulled wheats.

References to several hulled wheats are found in one of the most well-known authors of the time, i.e. Ibn-El-Awwam who lived probably during the 12th century (El Awam, 1988). He mentioned different types of hulled wheats very difficult to assign to species name. Some of the terms “alas”, “el-cali” and “el as-caliat” could refer to *Triticum monococcum* since einkorn is still known with very similar names in areas of Morocco. Other Arab sources include einkorn within the range of cereals used for making bread (Eguaras Ibáñez, 1988; García Sánchez, 1992).

Medieval archaeology, however, has not yet focused on these aspects so current documentation is still very sparse and limited to understand the role of hulled wheats during this period.

The Twentieth century

In order to follow the development and history of hulled wheats in Spain, it is necessary to consult the statistics published by the Spanish Ministry of Agriculture since 1900 (Ministerio de Agricultura Pesca y Alimentación (1904-1990)). These records report on hulled wheats, the land area they occupy and their production in each province. As in many other languages, Spanish identifies the three species under the same common name "escaña" and therefore, in many cases, it is difficult to distinguish amongst species. Based on traditional knowledge, however, it was possible in most cases to identify the species referred to in these records. For example, we know that in areas of La Mancha (provinces of Toledo, Ciudad Real, Cuenca) as well as in Albacete, the only hulled wheat known within living memory is *T. monococcum*. In Asturias, on the contrary, einkorn was never cultivated in the recent past, however, both emmer and spelt were cultivated and are identified under the same common name.

Apart from the official statistics, the unpublished reports from the “Germoplasm National” missions and some references (e.g., Alvargonzález,

1908; Dantín Cereceda, 1941; Buxó i Capdevila, 1989) very little was known about these species. Four years of research in Asturias and Andalucía and two in Navarra allowed us to reconstruct the distribution of hulled wheats as well as to collect a large amount of data on their uses and agronomic practices.

Hulled wheats were cultivated at a small scale under traditional agricultural systems. All three species faced the same fate in recent years. After the full mechanization of Spanish agriculture during the 1960's, the landarea under hulled wheats decreased dramatically; most recently, however, cultivation of hulled wheats is almost restricted to a few hectares in a few Spanish districts (Fig. 1). Furthermore, as the old generation of farmers give up land, the indigenous knowledge on how to grow these wheat species is lost forever.

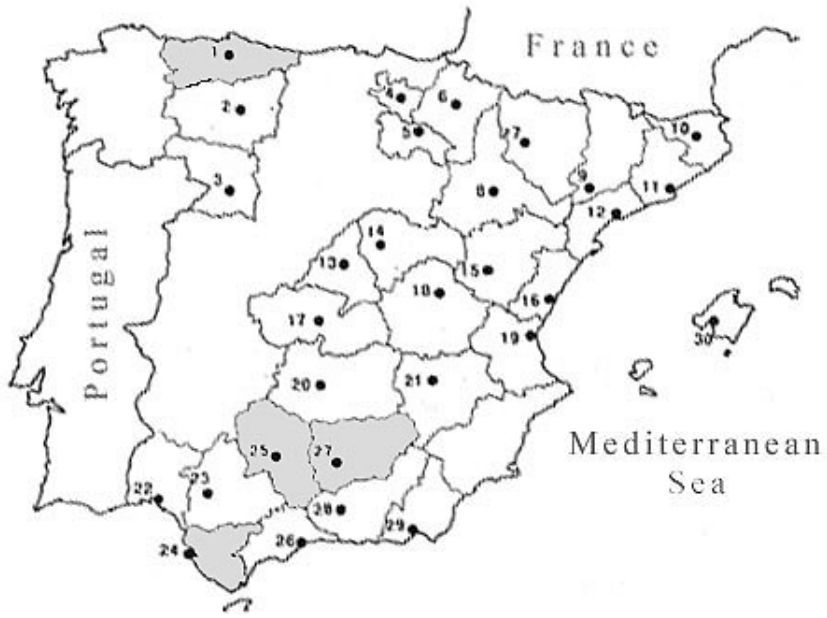

Fig. 1. Map of Spain showing provinces where hulled wheats were cultivated during the 10th century. Shaded areas indicate provinces where hulled wheats are still being cultivated. (1. Asturias, 2. León, 3. Zamora, 4. Álava, 5. La Rioja, 6. Navarra, 7. Huesca, 8. Zaragoza, 9. Lérida, 10. Gerona, 11. Barcelona, 12. Tarragona, 13. Madrid, 14. Guadalajara, 15. Teruel, 16. Castellón, 17. Toledo, 18. Cuenca, 19. Valencia, 20. Ciudad Real, 21. Albacete, 22. Huelva, 23. Sevilla, 24. Cádiz, 25. Córdoba, 26. Málaga, 27. Jaén, 28. Granada, 29. Almería, 30. Baleares).

Triticum monococcum

Einkorn was widely cultivated in many parts of Spain during this century, however, after agriculture was mechanized during the 1960s, the species can only be found under cultivation in La Mancha (Cuenca, Guadalajara), Madrid, Albacete and some Andalousian provinces (Málaga, Huelva, Cádiz, Córdoba and Jaén). During the last two decades, however, the crop survived in a few localities in Andalucía. In 1997, we only know of a single farmer who still grows einkorn in Córdoba province (Fig.1).

Large areas of Andalucía were surveyed (1991-1994) in search for any traces of hulled wheat cultivation. In most areas, people still remember its cultivation even after more than 20 years since it was last cultivated in their parts of the country. Finally, farmers in mountain areas of Córdoba (Sierra Subbética), Jaén (Sierra de Cazorla and Martos) and Cádiz (Sierra de Grazalema) still grow local landraces of einkorn. Throughout these areas, einkorn cultivation was associated with traditional farming and ways of life. Farmers still raise animals, mainly mules, to which einkorn was fed. In one case, in Cádiz, the straw was used for thatching buildings, i.e. houses, storage facilities and animal shelters.

Einkorn was found in neighboring Morocco, where a sizable seed collection was made and information was collected from farmers. Moroccan farmers, more or less, use the same agronomic practices to grow einkorn. Moreover, they use the grain and straw for almost the same purposes as in Spain.

Triticum dicoccum

Emmer was cultivated in different provinces of Spain during most part of the 20th century. However, in consulting the governmental statistics, it is very difficult to identify the hulled wheat referred to in these statistics at the species level. We certainly know that emmer was grown in Asturias where it is still can be found. In Navarra, however, it was cultivated as late as the 1960s and 1970s, after which according to local farmers, it disappeared altogether from this area. Finally, some information is available on the cultivation of emmer in areas of Cataluña and Burgos.

Triticum spelta

Spelt wheat seems to have been restricted, at least during this century, to Asturias. No information is available on its cultivation outside this area where it is still grown. Present-day distribution is restricted to the southernmost part of central Asturias, on the border with Castilla. It is cultivated in Somiedo, Belmonte de Miranda, Salas, Teverga, Grado, Proaza, Quirós, Lena, Mieres and

Aller.

Agronomic practices and crop processing

Generally, all three hulled wheat species are handled in the same way by farmers. The cropping season starts off with land preparations prior to sowing. Different types of tools are used, e.g., ards, hoes, “laias”. This latter is a kind of digging stick used in Navarra. During the autumn, the spikelets are sown by broadcasting. Later, at the beginning of the year for einkorn and some months later for emmer and spelt, the crops are weeded with different types of hoes, hooks and also by hand.

One of the most interesting operations is the harvest which takes place during the summer depending on the region. Like many other cereals, the most common way of harvesting is by sickleling (either with sickles or scythes) at different heights, e.g., low when the straw is needed and higher when farmers are only interested in grain. However, in Asturias harvest is carried out by using an implement called “mesorias” which consists of a pair of sticks (around 50 cm long each) joined by a piece of rope or leather (for full discussion on this implement see Peña-Chocarro, 1996). “Mesorias” are a kind of plucking clamps used for snatching off the ears. Similar implements are well documented in areas of Nepal (Toffin, 1983) and the Caucasus (Sigaut, 1978; Steensberg, 1943; Menéndez Pidal, 1993).

The next step in the agrarian cycle of hulled wheats consists of threshing. While free-threshing wheats are threshed to free the grain from the chaff, hulled wheats are threshed in order to break the ears into spikelets. Four different methods are followed in Spain: in Navarra and parts of Andalucía it was common to use threshing sledges fitted with rollers, discs, nails or flint teeth. Einkorn could also be threshed by trampling with animals, particularly when farmers needed unchopped straw. In large areas of Asturias, hulled wheats were threshed by beating the ears with wooden flails. Finally, we found examples of threshing einkorn by lashing the ears against the floor or a fixed object. Immediately after threshing the crop was winnowed out to remove contaminants (fragments of straw, weed seeds, etc.) and transported back to the village and stored.

In Asturias, prior to threshing the crop is parched in order to remove the awns. Parching is a very important issue since as Nesbitt and Samuel (1996) have put forward it would be a potentially source of charred remains from archaeological contexts. Many authors have been claiming that parching is a necessary operation to dehusk hulled wheats. However, there are enough data from ethnographic observations and experimental work, to suggest that parching is not necessary for dehusking hulled wheats (for full discussion see Nesbitt &

Samuel 1996 and Peña-Chocarro 1995). It seems that much of this confusion has arisen from the misinterpretation of some classical texts as well as from the misunderstanding of some of the operations carried out during the processing of hulled wheats in which fire was involved.

Dehusking of hulled wheats in Spain is traditionally performed with water-mills although there are references to the use of mortars and pestles in the recent past. Mills are again used for milling the grains into flour.

Uses

According to the region of cultivation, we were able to distinguish different uses of hulled wheats: their grains are used both for animal and human consumption whereas their straw is used for thatching, basketry and other uses. Some of this information has been published elsewhere (Peña-Chocarro, 1993; 1995; 1996; Peña-Chocarro and Zapata Peña, 1997); here we present a summary with references to other areas where hulled wheats are also cultivated, as well as new data on Morocco where we are conducting new investigations.

Einkorn

The crop is used only and exclusively as animal feed. It is consumed by animals, either as whole spikelets (goats, mules, donkeys and hens) or milled and mixed with water and/or with flours from other cereals (pigs and cattle).

Reported from Italy indicate that einkorn was used traditionally for animal feed (Hammer and Perrino, 1984; Perrino et al., 1996). In the Carpathians, the most recent use of einkorn is also for animal fodder. It is particularly good for cattle, pigs, sheep and fowl (Gunda 1983, Perrino et al., 1996). In Morocco, recent research (Peña-Chocarro and Zapata Peña, in prep.) indicates that einkorn is commonly fed to animals, particularly chickens.

Although einkorn was consumed by man in early history, it seems that, at least during this century, it has not been a major component of the human diet. However, within living memory, einkorn was consumed by people in times of scarcity, i.e. after the Spanish Civil War. This is also the case of other areas such as Morocco where our current research in the Rif shows that only exceptionally, einkorn is being consumed by the population. In areas of the Carpathians, however, einkorn is still used to make a local bread (Borza, 1945; Gunda, 1983).

Einkorn straw seems to have been an important product to justify its cultivation in some areas. In Spain (Western Andalucía), Morocco (western Rif) and the Carpathian area, the straw of einkorn has been traditionally used for thatching houses and huts. In Andalucía (in Cádiz province) there are still examples of what surely was a long tradition of using einkorn for roofing. The

main characteristics noted by farmers are hardness, ability to protect against rainfall and durability. A very similar situation was found in Morocco; farmers grow einkorn (*asqaliya*) mainly to use its straw for thatching. In both countries, einkorn is threshed by lashing the ears against a fixed object in order to obtain the straw with all its length. Vignet-Zunz (1993) noted that in some areas the ears are harvested first by sickleling very high in the straw and only later on is the straw harvested. In Cádiz province, the crop is harvested by cutting the straw close to the ground, then it is lashed to remove the heads. In Spain, einkorn straw has been also used for different purposes such as basketry or filling of mattresses and saddles. In Hungary, Gunda (1983) recalled the use of straw for making hats, singeing pigs, tying up of vine branches and maize stalks and for litter. Borza (1945) noted its use in Romania also for vine yards.

Emmer and spelt

Flour from emmer and spelt, either singly or mixed, are used in Asturias to produce different types of human foods. The most popular way of consuming emmer/spelt wheat is as bread. There are also other types of foods such as the "panchón" (a kind of dough slowly baked on the fireplace and consumed with milk and sugar) typical of the Aller region (Asturias). The flour is also used to produce a type of porridge traditionally consumed with milk, as well as pancakes and crêpes-type foods (Peña-Chocarro, 1996). However, despite the increasing popularity, consumption of hulled wheat did not spread outside its area of cultivation as it did recently in Italy (D'Antuono, 1989; Perrino et al., 1996). In some Italian regions, the new appreciation of emmer wheat led to the revival of traditional foods, and the invention of new ones, e.g. biscuits, pasta, etc. (Padulosi et. al., 1996; Perrino et al., 1998). Both species are also consumed by humans in areas of the Carpathians (Gunda, 1983), although spelt has far less ethnographic records as compared with emmer. Emmer is also used in Turkey for making bulgur (Hillman, 1984).

Emmer and spelt are rarely used in Asturias for animal feed. However, in those cases where it is used as animal feed, it is highly recommended for cattle that is going to be sold in markets.

Consumption of products made of emmer and spelt flour was reported to impart a very bright hair color in animals. In Italy, Hammer and Perrino (1984) reported the same quality but in pigs.

In Navarra, where emmer wheat has been cultivated until the 1980s it was exclusively used as animal feed (cattle, horses, pigs and sheep). Farmers recommended it for young horses, either milled, fed as whole spikelets or mixed with other grains.

Emmer in Navarra has been often harvested in late spring and used as green fodder whereas in Asturias, emmer and spelt were only occasionally used as green fodder. Other examples of emmer used for fodder come from Italy. In Alto Molise (D'Antuono et al., 1993) and further south in Italy (Hammer and Perrino, 1984) and from the Carpathians (Gunda,1983) where pigs fed with emmer are thought to have a tastier bacon.

Conclusions

The history of hulled wheats is, to a large extent, the history of agriculture (Nesbitt and Samue,l 1996). These ancient wheats were first grown in Spain some seven thousand years ago and farmers have maintained their cultivation ever since. Their conservation has been possible through their continuous use by farmers. Today, hulled wheats in Spain are endangered. Just a few farmers grow them for different cultural, social, economical and ecological reasons. It has been widely recognized that farmers have played, in the past and present, a most important role in the conservation of agricultural diversity. Their knowledge has become a crucial element for the conservation of plant genetic resources and for other disciplines such as archaeobotany. Farmers' knowledge is a very important part of people's cultural and genetic heritage; efforts should be made to conserve it.

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