

Rammed earth in Moravia (Czech Republic) in the context of neighboring lands

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ABSTRACT: Rammed earth has a long history throughout many parts of the Danubian region. Moravia is a historic land that is located in what is currently the Czech Republic. Rammed earth coexists here with other earthen techniques (daubed earth, cob, stacked or rammed bread-shaped pieces—*války* and adobe). The popularity of the rammed earth has grown since the end of the 18th century both as a consequence of the state interventions and the influence of earthen construction treatises. The use of the technique before this boom can be demonstrated by several examples identified by a historic structures analysis and can be traced back to the 14th–15th centuries in the written texts. The continuous tradition of rammed earth construction ended in the first decades of the 20th century. The few new constructions after World War II are already part of the general global trends.

1 INTRODUCTION

The building construction manifestations of the historical Czech lands (Bohemia, Moravia and Silesia) are similar to those of other Central European countries, with whom they share since 16th century the history of the Habsbourg monarchy with all its interventions in construction. Earth was used here mainly in conjunction with wooden support as wattle, corner timbering or timber framework, which both are characteristic for the medieval period. With the exception of unbaked bricks the massive earthen walls are present only in Moravia, especially in the lowland regions of its central and southeastern part, where construction materials other than soil were difficult to obtain. Rammed earth coexists here with other earthen techniques (daubed earth, cob, stacked or coffered bread-shaped pieces—*války*, adobe) and makes still an important contribution to the existing building stock of this region.

Use of rammed earth technique is not limited to vernacular buildings. It was identified also in historic town centres. It might exist even in Moravian capital Brno, where according to the building protocols in 1929 house No. 454 with “Pisé” walls in its upper floor was demolished and replaced by well-known functionalist building of Alfa Passage (Kujelová 2007).

Our current knowledge of earthen materials and techniques used in historic constructions is based

on the literary sources, field data gathered since 80th by our own inventory and historic analyses structures works and analyses of historic earthen materials carried out within the project conducted in 90th by Jan Kříž (Kříž & Vorel 1998, Syrová et al., 2000).

2 EARTHEN BUILDING MATERIAL

In the Morava valley loess was used as an universal building material for earthen constructions including traditional rammed earth mounted with wooden formwork (*nabíjenice*). Properties of earthen material could be improved by the addition of ceramic fragments (Jewish ghetto in Uherský Ostroh). On the edges of lowland, in the White and Central Carpatians, where the suitable gravelly soils were available in abundance, the rammed earth even became the main technique for the construction of the massive earthen walls.

2.1 Extraction of earth (*hliník*)

Earth for the construction was extracted usually in quarries called *hliník*, exceptionally on the site itself.

According to the so call stable cadastral plans from the second third of the 19th century mostly every Moravian village had its own *hliník*, which can usually still be easily identified. The area and

volume of many old quarries, in which groups of later cottages or wine cellars are often situated, indicates, that the whole villages used them for a long period.

3 HISTORIC MORAVIAN TECHNIQUES OF MONOLITHIC WALLS USING FORMWORK

Historic Moravian technique based on earth stuffed between formwork to make a homogeneous mass wall can be categorized either by the properties of earthen material or by the type of formwork.

3.1 *Rammed (moist fresh) earth*

Generally known technique is that of compacting moist fresh earth into movable formwork described by many authors (Bartoš 1895, Niederle 1923, Máčel & Vajdiš 1958, Frolec 1974, Mencl 1980). It is particularly widespread in SE Moravia in so called Moravian Slovakia region and in the White and Central Carpatians. Earth was dropped into the formwork in layers, up to 15 cm high. The corners were often reinforced by wattle, which may be found also between the layers.

3.2 *Coffered pressed bread-shaped cob (války)*

The second technique is that of coffered bread-shaped pieces (*války*), introduced in the Czech ethnographic literature by Antonín Václavík in the Slovak village of Chorvátský Grob, where also the technique of rammed earth described above was still used in the first decades of the 20th century (Václavík 1925). The detailed description of coffered *války* was brought by Josef Kšír from the Haná region in central Moravia (Kšír 1956). The hand made *války* were in plastic state thrown or simply put in the formwork and compressed to join together in a compact wall. The corners were usually reinforced by pieces of wood.

This technique, which is closer by the properties of the earthen mixture to cob, was widely used also in Znojmo region in SW Moravia and in the neighboring regions of Slovakia and Hungary (Syrová & Syrový 2007, Buzás 2011). All these regions knew also the technique of stacked *války* built up by hand without formwork (Syrová & Syrový 2007).

3.3 *Formworks*

Two basic methods of setting up formworks were used. They were common for both techniques and known also in other Danubian regions (Buzás 2011).

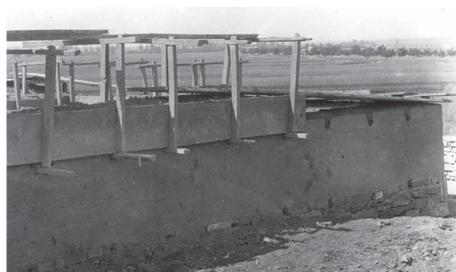


Figure 1. Rammed earth construction in Hroznová Lhota, distr. Hodonín, in 1910 (Karel Chotek).

Formwork sides, made from simple boards or several wooden planks, that are fixed together, can be supported by pairs of external vertical posts driven into holes dug in the ground and tied together on their tops by ropes. This method is considered to be more archaic, if not really older. It is characterized by absence of the holes in the wall.

The second method, when the formwork is supported by horizontal timbers passing through the wall, is more sophisticated. One of the few photographs depicting the course of construction, taken by Czech ethnographer Karel Chotek in 1910 in Hroznová Lhota (Fig. 1), shows this type of formwork (Niederle 1923).

In this case characteristic holes are formed. When the construction was finished, these holes were carefully filled, often with the same earthen and/or lime mortar, that was used for the rendering.

3.4 *Surface finishes*

In the historic Moravian constructions the vast majority of monolithic earthen walls was intended to be rendered. This includes, compared with adobe constructions, also farm building as barns, granaries or cellars. To ensure good adhesion, the surface of the rammed earth was roughened by diagonal cuts. The walls were rendered with lime mortar or traditionally with earth mixed with finely chopped straw, whitened with lime or later brightly coloured in blue or yellow.

In practice of nondestructive historic structures analysis and inventories that means, that it is difficult to distinguish rammed earth from other historic earthen techniques.

4 TRADITIONAL TERMINOLOGY

Traditional terminology of rammed earth as we know it mostly thanks to the ethnographic works is extremely rich and has links to the terms used in other Slavic languages. They derive mostly either

from the words referring to the process of ramming: *nabíjenice* or *nabíjenica* (the most common term used in Moravian Slovakia (Niederle 1912, 1923, Máčel & Vajdiš 1958)), *tlučenina*, *tlučénka*, *tlčénka* (Moravian Slovakia (Niederle 1923), region of Luhačovičské Zálesí (Niederle 1923, Václavík 1930) and Slovakia (Máčel & Vajdiš 1958)), *tlučenica*, *pichovanica* (Frolec & Vařeka 2007), *pěchovanica* (Niederle 1923), or to the infilling of the form-work: *sypanice* (archaic term used already in medieval texts collected as still commonly used in the dialects of Haná in SW Moravia (Bartoš 1895)). Václavík brings also the terms used for the rammers and pestes (*tlk*, *chlápač*, *pich*) in region of Luhačovice (Václavík 1930).

5 RAMMED EARTH HISTORY

5.1 *Rammed earth before the end of the 18th century*

5.1.1 *Archeological references*

References to the rammed earth constructions in published archaeological reports are extremely rare. In fact only in two retrieved cases, the archaeologists have come to a clear interpretation:

Moravian archaeologist Jaroslav Böhm, who led research of late Iron Age La Tène culture (180-30 B.C.) oppidum Staré Hradisko near Prostějov in 1934–1937, found dozens of dwellings with massive earthen walls about 50 cm thick, that he interpreted as rammed earth or adobe and presented with architect Alfred Piffl the ideal reconstructions of 4 types of these dwellings (Böhm 1936).

Latter example belongs to the period of so called “inner” medieval colonization. Team of archeologists discovered during their work in town of Rýmařov in the medieval mining zone of Jeseníky mountains in NW Moravia several remains of constructions, that can be interpreted as rammed earth. The most important is the building dated to the first quarter of the 14th century, situated approximately in the center of the fortified platform, probably residence of *fojt* (officer of the king, who served as administrator and judge). Its lower floor with internal dimensions of 8,3 × 9,5 m was constructed with rammed earth, the upper residential part with daubed corner timbering (Novák & Karel 1972). In the same site several cabins and one three part house built with rammed earth in the period of the foundation of the town in the 13th century were found (Goš et al., 1985).

5.1.2 *Written and literary sources*

In the Moravian written texts the rammed earth can be traced back to the 14th–15th centuries,

when terms *sypanice* (dry poured earth) or *tlučénice* (rammed earth) first appear beside general term *blátové domy* (mud houses). In the 16th century the term *hliník* (place of extraction of earth) is mentioned in the village of Petrov as place, where wine cellars were situated (Frolec 1974).

We can find also references of massive earthen constructions in Bohemia. Georgius Agricola includes in his famous handbook of mineralogy, entitled *De natura fossilium* (revised version from 1558) information on Central European clay deposits and argillaceous raw material occurrences, which he probably came to know from his own experience. In book II he describes also the use of earth and clays in building and refers to adobe and the rammed earth built according to Pliny’s description in Saxony, Bohemia and Hungary (Agricola 1955; Wilsdorf 1968).

5.1.3 *Constructions identified by surveys*

The use of the rammed earth technique before its boom in 18th–19th centuries can be demonstrated by several examples.

Still inhabited house No. 49 with porch—*žudr* dated 1596 containing two-storey chamber-granary with monolithic (rammed?) earthen walls in the market town of Pouzdřany (distr. Břeclav) belongs to the oldest Moravian vernacular buildings from the period before the Thirty Years’ War.

Coffered *války* were used for the construction of archaic houses with porch—*žudr* dating from 17th–18th centuries in Haná region and wine cellars dating from the same period in Znojmo region.

Also the rammed earth walls identified in several houses on the main square of Uherský Ostroh, though their dating is difficult because of significant reconstructions in 19th and beginning of 20th century, should be mentioned here.

5.2 *Rammed earth since the end of the 18th century till the end of continuous tradition*

5.2.1 *Interventions of modern state or enlightenment and bureaucracy*

The reforms of Mary-Therese and Joseph II and interventions of modern state with the first building codes, regulations against fire and repeated interdictions of wooden constructions undoubtedly played an important role in spread of earthen constructions in Czech and Moravian regions, where they replaced wooden and mixed constructions.

At their beginning is the fire patent for Moravian margraviat and for Bohemian kingdom from 1751, followed by patent for extinction of fires (1755), fire order of the emperor Josef II for Bohemian kingdom (1785), fire order for countryside, towns and villages in Moravia and Silesia (1787), decree of general obligation to

submit the plans of building construction (1788), general prohibition of wooden constructions (1816), decree authorizing peasants to produce bricks (1819) and orders of the construction for kingdom of Bohemia and margraviat of Moravia (1833, 1835). These slowly and with difficulty enforced regulations set out technical details of use of *clay* for fire protection purposes and conditions under which it is possible to build massive earthen constructions (construction purposes and location, wall thickness, height of plinths) (Ebel 2001, 2007).

The development was influenced also by changing relations between lords and peasants after the serfdom abolition in 1781, when peasants lost access to the construction timber from dominical forests, and the decrease of the forests in general.

5.2.2 *Building permission and the role of master builder*

Thanks to the decree of general obligation to submit the plans of building construction (1788) and the first building codes (1833, 1835) new actors are entering the scene of earthen construction. Only a trained master builder (*stavitel* in Czech, *Baumeister* in German) graduated obligatorily since 1810 from the polytechnic school, or under certain circumstances also a trained master mason, was responsible for the construction and entitled to draw up plans for building permission (Ebel 2007), that had to be, and since around 1850 in general really were, executed even for ordinary farm buildings (Ebel & Škabrada 1996, Syrová & Syrový 2011).

Among the most rich archives conserving plans and building protocols for reconstructions or new constructions we should mention in the context of monolithic earthen walls using formworks that of Příkazy (Olomouc), Uherský Ostroh and Mařatice (Uherské Hradiště). Though it was not custom to indicate the building material and technique with the exception of the firewalls in the plans and protocols, these documents are irreplaceable source especially in case of the structures preserved to these days.

Thanks to their training master builders and even master masons became familiar with contemporary treatises on construction and their knowledge blends with the local building traditions.

5.2.3 *Treatises on construction (Pisé-Bau or lepenice)*

The first treatises on rammed earth, that master builder could meet in Wien or Prague, where the Royal Nobility Engineering School was founded in 1718, were naturally in German, as the Polytechnic Institute was divided in German and Czech one in 1869 and the Imperial Czech Technical

University of Franz Joseph in Brno was founded only in 1899.

The works of François Cointeraux were soon translated in German (Cointeraux 1792–1794, 1793) and followed by the works of German speaking propagators of earthen constructions such as David Gilly (Gilly 1797). Builder handbooks and even teaching materials for secondary schools, which describe the rammed earth (*Pisé-Bau*) technique as the most advantageous earth construction method, were published also in Prague (Lengerke 1838, Jöndl 1840a,b, Jöndl et al., 1865) and in Brno (Gabriely 1861).

The first treatise dealing with rammed earth translated in Czech was that on construction, with regard to building in small towns and villages, published in 1840 by Johann Philip Jöndl (Jöndl 1840b), who devoted to the *Pisé-Bau* one chapter (§229–239), in which he gives illustrations and describes all the practical issues and rules of the construction, including its risks and prevention of possible problems. Although Jöndl is critical and distant (he “cannot help laughing at exaggerated enthusiasm of some *Pisé-Bau* propagators”), he is clearly aware of the advantages of *Pisé-Bau*.

Translation into Czech caused to Jan Nepomuk Štěpánek, who spent his entire life in Bohemia and could not come into contact with traditional Moravian buildings, a particular problem in finding a suitable Czech equivalent of the German *Pisé-Bau*. He translates it as *lepeniční stavba*, term, which can be found also as *lepenice* in the building regulations. Paradoxically the term *lepenice* is that used in historical texts and Czech dialects for massive earthen structures built without formwork and daub.

5.2.4 *Preserved building stock*

The end of the 18th and the whole 19th century became the golden age of unbaked bricks and rammed earth. The use of the rammed earth is limited in practice to Moravia with the rare exceptions identified in Bohemia like the farmhouse No. 17 in Bylany near Kutná Hora from the end of 18th century (Kibic 2004).

In Moravia the rammed earth is gradually used not only for the construction of residential and important farm buildings (Fig. 2), but also the most common small structures as vineyard cabins (Fig. 3). It also penetrates to the upland regions like Luhačovické Zálesí and Moravské Kopanice (Dobiáš 1892, Václavík 1930, Máčel & Vajdiš 1958), where the living tradition of rammed earth survived till the 20th century. One of the last documented newly built rammed earth constructions is that of the house No. 126 in Lopeník from 1925 (Máčel & Vajdiš 1958).



Figure 2. Rammed earth barns in Vnorovy, distr. Hodonín.



Figure 3. Wine cellars in Havřice, distr. Uherské Hradiště; recording by Otakar Máčel 1955 (National Heritage Institute).

5.3 Efforts to introduce new rammed earth construction in 20th century

5.3.1 Propagation after the World War I

The first period after the World War I is represented mainly by the book on local construction materials as contribution to the solution of housing shortage and protection of homeland (Fierlinger 1920).

5.3.2 Experimentations after the World War II

Propagation and experimentations in the 50 s and 60 s follow the example of fraternal socialistic states. In the spirit of the time the new term *hlinobit* derived from russian *землебит* appears. Publications from these period are however well informed (Havlíček & Souček 1958, Mach & Plch 1958). The rammed earth or compressed blocs were recommended for the construction of agricultural buildings and family houses. Several constructions were built in Southern Moravia and especially in Slovakia.

5.3.3 Ecological efforts since the nineties

Last wave of rammed earth revival after 1989 is also slowly becoming history. It is already part of the general global trends, but except its new ecological look it has many common features with the previous efforts to introduce new rammed earth construction in Czechoslovakia and Czech Republic in 20th century—from the enthusiasm of its propagators to the small number of implemented constructions. It is the restaurant *Rybářská bašta* in

Průhonice near Prague from 1997 (Petr Suske and SEA group), experimental building of unburned earth technologies including rammed earth, that should be mentioned for its architectural qualities and for the analyses that accompanied the construction from its preparation to the monitoring after its completion.

The construction of the extension of the farm No. 33 in Lysovice (Vyškov) also served for making the cognitive film for heritage conservation purposes.

6 RAMMED EARTH IN SURVEYS AND DOCUMENTATION

The surveys and documentation of earthen architecture carried out since the end of the 19th century are important source for its understanding.

They have their own history that we have tried to describe in previous texts (Syrová & Syrový 1995), from which we would like to select only few points.

6.1 Ethnographic surveys and inquiries of the late 19th and early 20th centuries

Researchers and amateurs of folk culture of this period were lucky to work in the period of still living tradition of rammed earth. The building technologies have not been the main subject of their interest, which regarding to vernacular architecture was focused on the decorative, archaic or likely ancient elements, habits and terms associated with construction or definition of regional types. They enlisted, however, the richness of traditional terminology and the descriptions of the rammed earth techniques as they heard about them or collected through enquiries from their respondents.

Unfortunately, most of the authors do not give reliable link between collected descriptions of constructions, technology and terms.

6.2 Recordings

Not counting the first works of ethnographic nature containing schematic plans (Niederle 1923), precise recordings by architects and civil engineers from inventory and documentation campaigns from the regions, where the rammed earth technique was used, are important sources. These are mainly the recordings elaborated by Otakar Máčel (Fig. 3) and Jaroslav Vajdiš and the ambitious work of Antonín Kurial and his students preserved in so called Kurial's archives, from which the districts Zlín, Uherské Hradiště and Hodonín are important in the context of rammed earth (Kurial 1978, 1986, 2007).

These already historical sources are gradually digitized and made accessible to the specialists and the public also through information systems, one of which is the Integrated Czech Heritage Information System. It actually enables also the consultation of the results of the project and surveys of SOVAMM relating to the earthen architecture.

7 CONCLUSIONS

We tried to give here a basic overview of our actual knowledge of the traditional rammed earth constructions in Czech Republic in their historical context including the history of regulations and rediscovery of rammed earth. The study of the sources has to face to the problems of inaccurate identifications and ambiguous interpretations and re-interpretations, that confirm the statement of Czech historian of art Oldřich Stefan, that the only source, that does not lie, is the construction itself.

Considering, that the majority of literary sources referring to our rammed earth constructions is inaccessible by the simple fact, that it is in Czech, we hope, that this overview, even if short and incomplete, may help to better understanding of the context of rammed earth in Europe.

REFERENCES

- Agricola, G. 1955. *De natura fossilium (Textbook of mineralogy): Translated from the first Latin ed. of 1546 by Mark Chance Bandy and Jean A. Bandy for the Mineralogical Society of America*. New York: Geological Society of America.
- Bartoš, F. 1895. *Dialektologie moravská: Nářečí hanácké a české*. Brno: Matice moravská
- Böhm, J. 1936. *Staré Hradisko II*. (s příspěvkem o stavební rekonstrukci od arch. Ing. A. Píffla). In Kündel, J. (ed.). *Ročenka národopisného musea města Prostějova a Hané 8*: 5–33. Prostějov.
- Buzás, M. 2011. The earthen architecture in the Carpathian Basin. In *Construire en terre, Actes; Colloque européen Construire en terre, Du patrimoine historique à l'architecture contemporaine, Des professionnels, des savoir-faire et des techniques en Europe*: 21–25. Marseille.
- Cointereaux, F. 1792–1794. *Praktischer Lehrbegriff der Baukunst auf dem Lande. 4 Teile in 1 Band*. Wien: Selbstverlag.
- Cointereaux, F. 1793. *Schule der ländlichen Baukunst, oder Anweisung feste Häuser ... blos mit Erde, oder, andern gemeinen und wohlseilen Materialien zu bauen: Mit einer Zugabe von dieser Bauart in Deutschland verfasst von Franz Cointereaux; in einem getreuen und vollständigen Auszug aus dem Französischen übersetzt*. Nürnberg und Altdorf: bei J.C. Monath und J.F. Kussler.
- Dobiáš, F. 1892. *Chalupy moravských Kopaničářů. Časopis Vlasteneckého muzejního spolku olomouckého 9*: 59–65.
- Ebel, M. & Škabrada, J. 1996. *Původní plánová dokumentace lidové architektury*. Praha: Vydavatelství ČVUT.
- Ebel, M. 2001. Jíly jako stavební materiál v legislativních pramenech 17. až 19. století. In *Křivoklát 2001: Jíly pro památky v praxi, Sborník přednášek z odborného semináře STOP*: 24–27. Praha: STOP.
- Ebel, M. 2007. *Dějiny českého stavebního práva*. Praha: ABF—Arch.
- Fierlinger, O. 1920. *Domáci staviva. Příspěvek k osídlování, řešení bytové otázky a o ochraně domoviny*. Praha: Minist. zemědělství.
- Frolec, V. 1974. *Lidová architektura na Moravě a ve Slezsku*. Brno: Blok.
- Frolec, V. & Vařeka, J. 2007. *Lidová architektura*. Encyklopedie. Praha: Grada
- Gabriely, A. 1861. *Hlavní pravidla stavitelství*. Brno: Bušák a Irrgang.
- Gilly, D. 1797. *Handbuch der Land-Bau-Kunst, vorzüglich in Rücksicht auf die Construction der Wohn- und Wirthschafts-Gebäude für angehende Cameral-Baumeister und Oeconomen*. Berlin: bei Friedrich Viewg dem ältern.
- Goš, V., Novák, J. & Karel, J. 1985. Počátky osídlení Rýmařova. *Památky archeologické 76*: 184–227.
- Havlíček, V. & Souček, K. 1958. *Stavby z nepálené hlíny*. Praha: Státní zemědělské nakladatelství.
- Jöndl, J.P. 1840a. *Unterricht in der Landbaukunst überhaupt und bezüglich auf Privat- und Gemeindegebäude in Landstädten, Marktstellen und Dörfern*. Prag: Druck und Papier von Gottlieb Haase Söhne.
- Jöndl, J.P. 1840b. *Poučení o stavitelství pozemním vůbec a zvláště vzhledem na privátní a obecní stavení ve venkovských městech, městečkách a vesnicích: Ponaučný a výkonný díl./Od J.P. Jöndla; V češtině od Jana Nep. Štěpánka*. Praha: Tisk a papír Synů Bohumila Háze.
- Jöndl, J.P., Niklas, J. & Šanda, F. 1865. *J.P. Jöndlovo Poučení o stavitelství pozemním*. Praha: I.L. Kober.
- Kibic, K. 2004. Objekt z dusané hlíny v Bylanech a další nálezy z Kutnohorska. *Památky středních Čech 18 (2)*: 33–44.
- Kříž, J. & Vorel, J. 1998. *Restaurování, sanace, rekonstrukce památkových objektů stavby, konstrukce, artefakty z nepálené hlíny, stavebně technologické předpisy. Výzkumný a vývojový úkol MK ČR*. Brno, Rožďalovice: unpublished document available at NPÚ, Praha.
- Kšir, J. 1956. Lidové stavebnictví na Hané. *Československá etnografie 4*: 325–366. Praha.
- Kujelová, D. 2007. *Alfa passage*. Brno: unpublished thesis available at Masarykova universita, Brno.
- Kurial, A. 1978. *Katalog lidové architektury, Část první, okres Gottwaldov*. Brno: KSSPPOP v Brně.
- Kurial, A. 1986. *Katalog lidové architektury, Část pátá, okres Uherské Hradiště*. Brno: KSSPPOP v Brně, Muzejní a vlastivědná společnost v Brně.
- Kurial, Antonín. 2007. *Katalog lidové architektury, Část sedmá, okres Hodonín*. Brno: NPÚ, úop v Brně.
- Lengerke, A. 1838. *Landwirthschaftliches Conversations—Lexicon für Praktiker und Laien*. Prag: Calve.

- Máčel, O. & Vajdiš, J. 1958. *Slovácko, architektonický vývoj vesnice*. Praha: NČVÚ.
- Mach, V. & Plich, V. 1958. *Stavba budov z hlíny*. Bratislava: Výskumný ústav stavebnictva v Bratislave.
- Mencl, V. 1980. *Lidová architektura v Československu*. Praha: Academia.
- Niederle, L. 1912. Starý selský dům na moravském Slovensku. *Národopisný věstník českolovanský VII*: 97–113. Praha
- Niederle, L. 1923. Ves, obydlí a dvůr. In Niederle, L. (ed.). *Národopis lidu československého I, 1(2): Moravské Slovensko*: 41–96. Praha: NSČ.
- Novák, J. & Karel, J. 1972. *Rýmařov—Hrádek (okr. Bruntál)*. Přehled výzkumu za rok 1971: 103–105. Brno.
- Syrová, Z. & Syrový, J. 1995. Inventory of earthen architecture in Czech Republic, evolution of methodological approach from the beginnings of interest in the 19th century and present activities. In Watson, L. & Harries, R. (eds) *Out of Earth II, National Conference on Earth Buildings*: 25–45. Plymouth: CEA, Plymouth School of Architecture, University of Plymouth.
- Syrová, Z., Syrový, J. & Kříž, J. 2000. Inventaire, documentation et méthodologie de conservation de l'architecture en terre en République Tchèque. In *Terra 2000, 8th International Conference on the study and conservation of earthen architecture, Torquay, Devon, UK, May 2000*: 430–435. London: James & James.
- Syrová, Z. & Syrový, J. 2007. La bauge en Moravie dans le contexte des constructions historiques en terre crue de la région danubienne. In Patte, E. & Streiff, F. (eds) *L'architecture en bauge en Europe, Actes du colloque Colloque européen organisé à Isigny-sur-Mer du 12 au 14 octobre 2006, Les Veys*: 117–131. Les Veys: Parc naturel régional des Marais du Cotentin et du Bessin.
- Syrová, Z. 2011. Constructions en terre crue des pays historiques tchèques (Bohême, Moravie—Silésie). In *Construire en terre, Actes; Colloque européen Construire en terre, Du patrimoine historique à l'architecture contemporaine, Des professionnels, des savoir-faire et des techniques en Europe*: 29–33. Marseille.
- Syrová, Z. & Syrový, J. 2011. La brique crue moulée dans les pays historiques tchèques (Bohême et Moravie—Silésie). In Chazelle, C.A., Klein, A. & Pousthomis, N. (eds) *Les cultures constructives de la brique crue: Echanges transdisciplinaires sur les constructions en terre crue; vol. 3*: 248–260. Gap: Editions de l'Espérou.
- Václavík, A. 1925. *Podunajská dedina v Československu*. Bratislava: Vydavateľské družstvo v Bratislave.
- Václavík, A. 1930. *Luhačovické Zálesí*. Luhačovice: Musejní společnost v Luhačovicích.
- Wilsdorf, H. 1968. Dr. Agricola (1494–1555) über ländliche Bauweise und Baumaterial in Sachsen, Böhmen und Ungarn. *Sächsische Heimatblätter 14*: 251–256.