

THE ITALIAN ACADEMIC RESEARCH ON BEER: PAST, PRESENT and FUTURE

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ABSTRACT

In this review, the Author wants to share his experience and opinions after 45 years of academic research on beer. The first part of this review is dedicated to the over time situation of the Italian beer firms. The main core of the paper deals with the historical aspects of the Italian academic research on beer and its relationship with beer industries. The importance of the Italian research is also compared with the European situation. The University Teaching on this matter is also discussed. Finally it is suggested how to further upgrade the quality of the existing University research centres and laboratories. Up to 194 references are presented.

Keywords: beer, malt, hop, *Humulus lupulus*, breweries, research

1. THE REFERENCE FRAMEWORK

The scenario of barley, malt and beer production in Italy has changed in a very important way in the last 20 years.

Italian farmers were always involved for producing barley basically for animal feeding (*Hordeum vulgare*) with high content of starch and protein and in limited quantities as *Hordeum disticum* for selling to the Malting Industries (Agroalimentare Sud and Saplo) (1-2) for their utilization in malt production. In this case it was requested a limited presence of nitrogen (<1,6%) and beta-glucans.

The Italian average year production is ca. 1,2 million of Tons (= ca.300.000 Ha).

This reality did not change until Craft Breweries started to enter in the market, often asking for special malts. The Malting Industries could not easily provide such malts in limited quantities because the size of their producing plants, obviously not satisfying all the different and small requests of Craft Brewers.

While many small Craft Brewers finally accepted to produce beer with the standard malts available on the Italian market, some other new born Craft Brewers were then obliged to search their malt with particular specific characteristics outside Italy, where the elasticity of some Malt Producers was more present. (3)

In force of a further increasing need, few large Craft Brewers decided to build their own Malting Plants (e.g.: Mastri Birrai Umbri (PG), Cobi (AN), La vallescura (PC) (4-6), for their internal utilization and also for specific external customers.

In the last 5 years this fact convinced several farmers to modify their crop rotation introducing barley for beer, indirectly answering to the increasing and continuous requests of Craft Brewers. This particular type of barley, in some particular Region, was also considered by the Regional Agricultural Officials as a real and possible alternative utilization to some traditional crops that appears to be not economical anymore.

In addition to that, the cultivation of hop (*Humulus lupulus*) is also emerging, even if in small dimension.

While beer was traditionally considered an industrial product (so then under the control and jurisdiction of the Italian Ministry of Industry), these changes were finally recognized by the Italian Ministry of Agriculture. With its Ministerial Decree 212/2010 Beer was recognized to be an agricultural good, allowing all the products of the processing chain to have also access to Italian and EU agricultural advantages (PAC, FEASR, Horizon 2020, etc.).

2. THE ITALIAN BEER INDUSTRY SITUATION

Even if the presence of Beer Industry in Italy really started in 1829 (Wührer), in 1766 Mr. Lenz requested H.M. Empress of Austria authorization to produce Theresianer Beer in Trieste and in 1789 Mr. Ketter obtained from the Savoy State permission of producing beer in at that time Italian town of Nice (7).

Many important changes have occurred in the last 20 years, modifying deeply the Italian Beer Firms scenario. At the beginning, the majority of Italian beer Firms were owned by Italian families:

1829. Birra Wührer (fam. Wührer, Brescia)

1835. Birra Venezia (fam. Biliotti, Venezia)

1837. Birra Zimmermann (fam. Zimmermann, Aosta)

1837. Birrificio Rienza- Birra di Dobbiaco (fam. Reichholf, Dobbiaco)

- 1840. Birra Chiavenna (fam. G.Ritter, Chiavenna)
- 1845. Birra Bosio & Caratsch (famm. Bosio e Caratsch, Torino)
- 1846. Birra Peroni (fam. Peroni, Vigevano)
- 1846. Birra Menabrea, fam. G. Menabrea, Biella)
- 1848. Birra Perla Crova - Metzger (fam. Metzger, Torino)
- 1857. Birra Forst (fam. Wallnöfer e Franz Tappeiner, (Lagundo)
- 1858. Birra Bonino (fam. G. Bonino, Cuneo)
- 1859. Birra Moretti (fam. Moretti, Udine)
- 1865. Birra Dreher (fam. P- Revoltella, Trieste)
- 1877. Birrificio Angelo Poretti (fam. Poretti, Veduggio)
- 1879. Birra Orobica (fam. Von Wunster, Bergamo)
- 1893. Birra Livorno (famm. Del Moro e Di Giacomo, Chiavenna)
- 1897. Birra Pedavena (fam. Luciani, Canale d'Agordo)
- 1905. Birra Busalla (famm. Ricchini e Poggi, Savignone)
- 1912. Birra Ichnusa (fam. Amsicora Capra, Cagliari)
- 1995. Birra Castello (Gruppo E.Verardo, S. Giorgio di Nogaro)
- 2000. Birra Theresianer (fam. M. Zanetti, Nervesa della Battaglia)

In addition, up to 1959, were existing and operating almost other 80 small Craft Breweries (8).

Historically, the first multinational corporation entrance in Italy happens in 1959, when Heineken acquired 5-10% of Dreher. In 1974 Dreher was then fully absorbed by Heineken. Between 1982 and 2002, Carlsberg progressively acquired the Poretti Group.

Today the opposite is true: all the industrial Breweries belong to Multinational Corporations (Heineken, Anheuser-Busch Inbev, Carlsberg, Asahi, SAB, etc.), absorbing almost all of the old family Firms, while only three of them still remain family owned (Castello, Forst, Theresianer).

In the mean time, we observed a massive growth of small-medium craft Breweries, almost reaching about a thousand, with a very large variability on their product quality and quantity. Their almost exhaustive list could be found in the Web Sites of Assobirra and Unionbirrai (9) (10).

3. THE ITALIAN ACADEMIC RESEARCH ON BEER

As far as I can go back in time, beer research was started and carried on by prof. C. Cantarelli, University of Perugia, in occasion of the 1965 Beer Monde Selection. In this occasion, the Institute of Food Science, University of Perugia, was part of the analytical selection of participating beers and started the interest on beer.

In 1970, was published the first academic paper on beer (11).

According to Scopus (12) the papers published in Italy by academic scientists on beer from 1971 up to 2017 were 194, divided as follows:

From 1971 to 1989

Only 2 papers published, 1 on alcohol risk on beverages, including beer, and 1 on hop botanical characteristics.

From 1990 to 1999 :

22 papers, 8 of which in beer technology.

From 2000 to 2009:

64 papers, 26 of which in beer technology.

From 2010 to 2017.

106 paper on different topic, 93 of them on beer (Table 1).

For a more complete information, I listed in the Addenda A all the found references since 1971) (13).

Table 1. Papers published on beer in the Italian Universities (years 2010-2017).

University	# of Paper(*)
Perugia	34
Viterbo (Tuscia)	11
Piacenza (Cattolica)	11
Ancona (Marche)	7
Sassari	7
Salerno	5
Milan	4
Udine	4
Naples	3
Rome	3
Florence	2
Turin	1
Trieste	1
Total	93

(*) some papers may be contemporarily listed in different Universities (Co-Authors).

All these data do not take into account oral communications or posters in national or international Congresses, as suggested by the ANVUR-VQR (Italian Evaluation of Quality in Research) (14) because of their low scientific impact.

This 35 years analysis show a progressive increase in papers, but only in the last decade it has been seen an important amount of interests inside the Italian Universities.

Furthermore, if we compare papers from the top 20 publishing European Countries (only Universities), we may observe on Table 2 the last 8-years situation.

From this table, Italy appears to be third in ranking, indicating how the interest of Italian Academic world increased in the last 8 years on this matter.

An important point that needs be further explored, and not still done, should be the comparison between the sum of "citations" received worldwide by the Italian papers with the sum of "citations" received by other Country papers. In fact, these data will potentially show the true interest (... and indirectly the quality) of the Italian scientific research on beer.

Table 2. Distribution of paper on beer published in European Universities in the 2010-2017 period.

Country	# of papers	%
Germany	280	13,2
United Kingdom	202	9,6
Italy	194	9,2
Spain	191	9,0
France	98	4,6
Belgium	183	8,7
Czech Republic	188	8,9
Netherlands	131	6,2
Poland	31	1,5
Denmark	120	5,7
Sweden	115	5,4
Portugal	87	4,1
Ireland	73	3,4
Finland	54	2,6
Russian Federation	37	1,8
Switzerland	42	2,0
Romania	23	1,1
Austria	21	1,0
Bulgaria	34	1,5
Greece	10	0,5
Total	2116	100,0

4. THE ACADEMIC RELATIONSHIP WITH BREWERIES

Before 1995, only direct consultancies and assignments existed between single University scientists and Breweries. The quantity or quality of them is generally covered by privacy.

The first known public Italian academic joint research with Italian Breweries started in 1995, when Assobirra, the Italian Association of Malsters and Brewers, financed a strategic project on “Micronutrients on Beer”, having two main consultants (University of Perugia and INN Rome, the Italian Institute of Nutrition). This Project ended in 1998.

From 1999 up to 2002, Assobirra was the Lead Partner of the MIUR-PNR Project on “Nutritional Characteristics of fermented beverages and Product innovation”, totally devoted to demonstrate the antioxidant capacity of beer. This Project was carried on by the Consortium “BirraViva” formed by Peroni, Forst, Heineken, Poretti, Castello and Menabrea. Several Italian Research Centres and Scientists participated as Consultants (Universities of Milan, Perugia, Rome and INN, Rome).

Considering the outstanding obtained results of the project, Assobirra started a deep scientific cooperation with the University of Perugia that finally gave birth in 2003 to CERB (Centro di Eccellenza per la Ricerca sulla Birra - Italian Brewing Research Centre) which I directed from the foundation to my retirement in 2015.

During this period CERB had the unique possibility to observe all the research (and the related researchers) carried on in Italy in the beer sector. Moreover, my membership in the

EBC Brewing Science Group still provide also the possibility to compare the Italian and the European situation on academic research.

Within respect to the other Countries, I may observe that today in Italy there is a general lack of public founding for basic and applied public research and it is almost absent a fundamental research partnership with big beer Industries.

In fact, international Beer Corporations possess their own large research laboratories and, when there is a need of external assistance, they are used to discuss and get quick answers (no waiting for preliminary studies on the requested matter) with well-established and proactive European academic realities (e.g.: Nottingham, Ghent, Copenhagen, Louvain, Weinstephan, Berlin) rather than emerging although qualified Italian realities (Perugia, Piacenza, Viterbo, Ancona, Sassari and Udine)

As a matter of fact, only the following three important Projects:

A) on Mycotoxins (A-MICO) (15),

B) on Cereals (CERSUOM) - both financed by the Ministry of Agriculture in the years 2008-2011 (16),

C) on Supply Chain GMO Traceability, financed by Assobirra - still outgoing- (17), were financed during the last 10 years.

Meanwhile, and mainly at regional level (Directive 2014/23/EU for financing POR-FESR 20114_20120 -PSR- Regional Developing Plans), small projects and consultancies are active between several University Departments and small Craft Breweries on different specific topics.

5. THE ITALIAN ACADEMIC TEACHING ON BEER

“Teaching” is an important part of the academic duties.

To my knowledge, while “Beer” is partially present in the Courses in Food Technology in many Italian Universities, only two Universities have official regular Courses on beer: Perugia and Udine.

During my stay at the University of Udine, I activated in 1981 the first Course in “Beer Technology” inside the Degree of Food Science and Technology at the local Department of Food Science and Technology.

At the beginning, this Course was exceptionally taught by Dr. Zangrando and successively by Dr. Collavo, at that time respectively Plant Managers of Birra Moretti and Birra Pedavena.

Today the Course is under the responsibility of Prof. Buiatti, University of Udine.

In Perugia the official teaching of beer started on 2007 and the situation was progressively upgraded during the last 15 years.

In 2007 CERB started a 5 day “preparatory” internal Course (“How to Become a Brewmaster”) that contributed effectively to the large increase in number, and often in quality, of Italian Craft Breweries.

This course reached this year the 20th edition and, in 8 years, received more than 350 students.

To enlarge the floor and to raise quality, the Department of Agricultural, Food and Environmental Sciences of University of Perugia created in 2009 a First Level Master Degree on “Brewing Technology” and in 2014 we enlarged the previous University Degree Course in Agro-Food Sciences and Technologies with an additional 3 years Curriculum in “Brewing Technologies”. During my Professor tenure in Perugia I considered fundamental, as I did previously in Udine, to call for seminars every year specialists from the Italian Beer Companies in order to enrich, with their expertise, the students, allowing them to have a true contact with the industrial external reality, in addition to the internal

academic experience. In 2013 together with Assobirra and the Director of our Department in Perugia we formally agreed to have, every year, additional distance-learning Courses given by specialists from Beer Companies on applied beer technology. When I retired, I left this important tool to the Professors and Researchers of my Group, hoping they would understand how a continuous scientific exchange between industrial and academic people should be kept alive and not abandoned.

5. CONCLUSIONS

How to allow all “young” Italian academic Research Centres or Laboratories to upgrade and to reach the level of others well-established European labs? A brief list of priorities includes:

First: increasing their internal scientific force by hiring permanent and multitasking skilled expert scientists, in order to be contemporarily proactive for incoming requests,

Then: publishing qualified and peer-reviewed scientific researches in high level Journals rather than communications or posters in national or international Congresses,

Finally: being principal rather than side-Partners in international Projects and being ready in solving industrial needs.

To accomplish these priorities and to obtain a real upgrade in quality and external credibility, the Italian University Research Centres compulsory need to have availability of money, granted by European or Italian public Organizations or from the Beer Industries.

Consequently, the Universities must be professionally dedicated in Fund Raising.

They should not count on money coming from Teaching. In fact, while “Teaching” is an important mission and an academic duty because is a fundamental preparation of students for their future external position and careers, the real impact on research fund raising is minimal.

The net income from student taxes cannot allow its utilization for research project or contracts, being limited in quantity and in availability. The only limited positive point is a utilization of students as a partial support in the research projects when already in progress in the labs.

It is obvious that the major responsibility for a scientific growth falls to the involved Scientists, because funding comes only from their scientific credibility and from their international well-established reliability.

Of course, another alternative or parallel route for found rising is to focus on Craft Breweries, which continuously need a lot of help and advice from University Scientists. This choice can allow a safe but slower growth of the Italian University research on Beer.

ACKNOWLEDGEMENTS

During my long academic tenure as Professor at the University of Perugia, many top Executives and Managers of Assobirra, together with skilled Technologists of the Beer Industry (Carlsberg, Heineken, Inbev, Peroni, Saplo, Theresianer), participated as Teachers in my Courses and as Special Guests in particular Events, believing all in the idea of an Italian Academic School on Beer. Hoping I did not miss someone, I want to thank all of them for that. They are: Andrea Bagnolini, Flavio Boero, Michele Cason, Roberto Cavalli, Francesco Collavo, Leonardo Di Stefano, Leonardo Di Vincenzo, Pietro Fontana, Alberto Frausin, Harald Fuchs, Vittorio Gorza, Antonio Marra, Gennaro Marturano, Lorenzo Morena, Mauro Niada, Paolo Papetti, Rodolfo Peroni, Piero Perron, Daniele Rossi,

Raffaele Sbuelz, Fabio Scappaticci, Alessandro Senia, Luigi Serino, Filippo Terzaghi, Tullio Zangrando, Agata Zani, Giorgio Zasio.

Finally, from the Academic side, I want to sincerely thank Prof. Luigi Montanari, University of Sassari. He believed and helped me from the beginning, thereby allowing our Italian University "Beer Dream" to become a reality.

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