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HOP SCIENCE

KNOWLEDGE FOR YOUR SUCCESS

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How our life has changed since my last Newsletter!

I hope you are all well and healthy. Due to the drastic events caused by the Covid-19 pandemic starting (for us in Germany) at the end of February, I was not able, and also did not feel it was appropriate, to write and publish a new Hop Science Newsletter. How can Hop and Brewing Science be relevant while others are fighting for their jobs and lives?

So I started researching if hops have something to offer in the fight against virus-related diseases, and here is what I have found:

ANTIVIRAL ACTIVITY OF HOP CONSTITUENTS AGAINST A SERIES OF DNA AND RNA VIRUSES.

Already in 2004, this US Research Team found a number of viruses that can be influenced and suppressed by hop components. They investigated whether hop extracts and purified hop components have antiviral activity. These hop constituents were tested for antiviral activity against bovine viral diarrhoea virus (BVDV) as a surrogate model of hepatitis C virus (HCV), human immunodeficiency virus (HIV), influenza A virus (FLU-A), influenza B virus (FLU-B), rhinovirus (Rhino), respiratory syncytial virus (RSV), yellow fever virus (YFV), cytomegalovirus (CMV), hepatitis B virus (HBV), and herpes simplex virus type 1 (HSV-1) and type 2 (HSV-2). The extracts all failed to prevent the replication of HIV, FLU-A, FLU-B, RSV and YFV. However, a xanthohumol-enriched hop extract displayed weak to moderate antiviral activity against BVDV with IC(50) (required amount for suppression below 50%) values in the low microg/ml range. Pure iso-alpha-acids demonstrated low to moderate antiviral activity against both BVDV and CMV, also with low IC(50) values. No antiviral activity was detected using beta-acids or a hop oil extract. Xanthohumol as an individual component accounted for the antiviral activity observed against BVDV, HSV-1 and HSV-2. xanthohumol was found to be a more potent antiviral agent against these viruses than the isomer iso-xanthohumol. For Rhino, the opposite trend was observed, with iso-xanthohumol showing superior antiviral activity to that observed with xanthohumol. Xanthohumol also showed antiviral activity against CMV, suggesting that it might have a generalized anti-herpesvirus antiviral activity. Again, superior antiviral activity was observed with the xanthohumol isomer against CMV. In summary, iso-alpha-acids and xanthohumol were shown to have a low-to-moderate antiviral activity against several viruses.¹

WHERE XANTHOTHUMOL IS ALSO PROMISING

Infections with porcine reproductive and respiratory syndrome virus (PRRSV) have a severe impact on the world swine industry. However, commercially available vaccines provide only incomplete protection against this disease. Thus, novel approaches to control PRRSV infection are essential for a robust and sustainable swine industry. In this study, xanthohumol (Xn), a prenylated flavonoid extracted from hops (*Humulus lupulus* L), was screened amongst 386 natural products to inhibit PRRSV proliferation and alleviate oxidative stress induced by PRRSV. These Chinese researchers found that Xn could inhibit different PRRSV sub-genotype strain infections. In addition, it caused decreased expression of interleukin and tumor necrosis factor- α , both relevant for communication of infected cells. Animal challenge experiments showed that Xn effectively alleviated clinical signs, lung pathology, and inflammatory responses in lung tissues of pigs induced by highly pathogenic PRRSV infection. The results demonstrate that Xn is a promising therapeutic agent to combat PRRSV infections. ...²

HOPS AND ANTI-INFLUENZA ACTIVITY

These Italian researchers tested a hydroalcoholic hop extract for its anti-influenza activity. The ability of the extract to interfere with different phases of viral replication was assessed, as well as its effect on the intracellular status being unbalanced in infected cells. A phytochemical characterization of the extract was performed. The researchers found that hop extract significantly inhibited replication of various viral strains, at different times from infection. Viral replication was partly inhibited when virus was incubated with extract before infection, suggesting a direct effect on the virions. Since hop extract was able to restore the conditions of infected cells, its antiviral activity might also be due to an interference with redox-sensitive pathways required for viral replication.





Accordingly, the extract exerted radical scavenging and reducing effects and inhibited lipoperoxidation and cytotoxicity. Using phytochemical analysis, different phenolics were identified, which altogether might contribute to the antiviral effect. These results highlight anti-influenza and antioxidant properties of hop extract, which encourage further in vivo studies to evaluate its possible application.³

REFERENCES:

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From other studies with xanthohumol we have learned that the bioavailability of this compound is challenging - one reason why some of the studies were not continued. At the same time, producing a highly purified xanthohumol extract out of hops, where the concentration is max 1% is very cost intensive.

**OUTLOOK HOPS ACADEMY:
HOPS ACADEMY GOES ONLINE**

We are working feverishly on transferring our Hops Academy programs into webinar formats. We will start with a series about dry hopping. We will talk about all the parameters and challenges influencing the flavour and aroma of dry hopped beer. The start date is May 19th at 2 pm German time. Participation is free, please register here www.barthhaas.com/hopsacademy

