**RRES Press Release 30 Oct 2020 Crop disease research suggests greater face mask use is a wise move**

***Studies into fungal spore spread shows coronavirus may stay airborne longer than thought***

Evidence backing tougher Covid-19 face mask rules has received support from an unlikely area of research – agricultural science.

With face covering guidance varying between nations within the UK, uncertainty over when to wear masks is widespread - and an expert in the transmission of crop diseases says the chances of inhaling water droplets containing coronavirus could indeed be greater than previously thought.

Rothamsted’s Dr Jon West, who studies the various ways crop diseases can spread, says some water droplets produced from coughing, sneezing or even normal speech can persist in the air long enough to travel many metres.

Writing the in the journal [Frontiers in Public Health](https://doi.org/10.3389/fpubh.2020.551836), Dr West says previous research into the spread of plant pathogens in water droplets places even greater importance on the wearing of face masks – perhaps even in crowded outdoor areas.

“The behaviour of a water droplet once in the air is the same, whether it holds coronavirus, a plant fungal spore, or nothing harmful.

“Current thinking is that the large droplets we produce, say when sneezing, can travel very quickly over a few metres but they don’t stay airborne for long. On the other hand, the microscopic droplets we produce stay airborne for minutes and sometimes hours but just like smoke they disperse rapidly, and any one individual droplet has a low likelihood of being infective.

“But what we know from studying the spread of crop fungal diseases – and what is not well known for coronavirus - is that a third size-category of medium sized water droplets, ranging in size from a hundredth of a millimetre to one millimetre can actually hang around for more than 30 seconds in windy conditions and travel tens of metres.”

Whilst it is difficult to study dispersal of human pathogens in real conditions, there is a wealth of literature on the dispersal of plant pathogen spores that Dr West says we can use as a proxy to estimate droplet dispersal of human viruses in this case.

Along with his colleague, Dr Sarah Perryman, he has looked at the dispersal of water droplets that contain plant pathogen spores, which can be splashed by rain from infected leaves, fruit or plant debris.

Just as with coughs and sneezes, different sizes of droplet are produced. These comprise relatively large droplets (between 1 and 5 mm diameter) that are dispersed ballistically up to a few metres; aerosolised microscopic droplets (smaller than one hundredth of a millimetre), which can remain airborne for over a hour even in still air; and the intermediate-sized droplets that form a fine spray that fall in still air but remain airborne for much longer than ballistic droplets and are potentially able to be blown in the wind for many metres.

Using a wind-tunnel in combination with a rain-tower to produce splash droplets from the surface of orange fruits infected with a fungus, they found that as wind speed increased, a greater number of fine droplets, potentially carrying fungal spores, were blown downwind.  At the maximum wind speed investigated (7 m/sec), these fine droplets were detected 8 m downwind of the source - and they were still moving upwards.

Dr West said: “The effects of turbulence in moving air can cause intermediate-sized droplets to remain airborne and even disperse upwards as they travel down wind. This size-range of droplets is larger than those normally considered to form an aerosol and may have been neglected in previous medical studies but we know many other biological particles in this size range disperse in air, such as  spores from the cereal rust fungi which can disperse in air across continents and oceans, or moss spores up that have been collected in the arctic having dispersed from warmer production sites much further south.”

To sample very small droplets or small dry particles, it is important to use the correct air sampling devices. According to Dr West, many such studies use equipment that may not collect small particles efficiently.

“The persistence of activity of coronavirus particles in airborne droplets appears to be sufficient to pose a threat. Droplets may not even require coughing because production of fine droplets containing influenza virus particles has been demonstrated simply from normal breathing.

“If subsequent dispersal of aerosolised droplets shown in plant pathogen studies pertain to aerosolised droplets containing covid virus particles, and assuming estimates of up to seven hours duration of activity are correct, logic suggests there must be potential for an aerosol-based infection route for this disease, which could occur at significant time after droplet production and also at distances downwind of an infected person in outdoor conditions.

“The fact that many thousands of microscopic droplets are produced by a cough and with the possibility that intermediate-sized droplets can also remain in air for many seconds, travelling many metres in outdoor moving air, greater importance should be placed on using facemasks to prevent these droplets being inhaled.”

Publication

West JS and Perryman SAM (2020) COVID-19: Dogma Over Potential for Prolonged Droplet Dispersal in Air. Front. Public Health 8:551836. doi: 10.3389/fpubh.2020.551836