Transcript video

(0:00 – 0:05)
Here we demonstrate with statistical significance how Black truffle winter production is driven by
Mediterranean summer precipitation.

This study is a collaboration of mycologists, ecologists and climatologists from Spain, Switzerland
and the United Kingdom.

(0:06 – 0:14)
Tuber melanosporum, the commonly named Périgord Black truffle is the edible fruitbody of one of
the world’s most valuable fungi.

Current global demand for this delicacy garners prizes in excess of 5,000 Euro per kilogram.

These belowground ectomycorrhizal fruitbodies grow in a symbiotic partnership with a variety of
deciduous host tree species.

(0:14–0:32)
In France alone, assets of the current truffle market have been estimated at about 67 million Euro
per year.

This sector includes the marketing of fresh and processed truffles, as well as transformations of
their fruitbodies into secondary products, such as truffle oils.

Moreover, truffles set a new trend in the form of mycotourism emphasizing the gastronomic
pleasures of locally harvested wild and cultivated mushrooms.

(0:32–0:48)
Today, almost 90% of the Mediterranean truffle harvest comes from plantations in north-eastern
Spain, southern France and north-central Italy.

The individual plantations may range in size from a few thousand square meters to several
hundred hectares.

Approximately 16 km2 of arable land in northeastern Spain and southern France are transformed
each year into new plantations of the Périgord Black truffle, with slightly smaller units in
northcentral Italy.

(0:48–0:54)
At the same time, truffle hunting in those forests where the truffle occurs naturally is declining.

(0:55–1:02)
A warming-induced drying trend since the 1970s threatens truffle production in plantations across
southern Europe.

Increasing summer drought conditions challenge local irrigation systems, which may have large-
scale economic consequences as water becomes more valuable.

(1:02–1:20)
Predicted climate change in the western Mediterranean basin will increase the competition for
water amongst various agricultural sectors.

An increase in the intensity and severity of summer droughts will poses a serious threat for the
growing truffle sector.

Due to the hidden belowground lifecycle of this iconic species, and its complex host symbiosis, as
well as the direct and indirect impacts of climate change, truffle cultivation is still associated with
high ecological and economic risks.

(1:21–1:35)
Figure 1 shows for the truffle production regions in Spain, France and Italy, the correlations
between normalized monthly and seasonal precipitation totals and truffle production.

In all three regions, the current June–August precipitation is significantly correlated with the
truffle production in the following winter.

(1:36–1:50)
Figure 2 illustrates how local truffle production is correlated with regional summer precipitation.

The strength of the relationship decreases from west to east as hydroclimatic conditions become
more favourable for fruitbody production.

(1:51–2:05)
Figure 3A summarises the relationship between total Mediterranean truffle production and
June–August precipitation.

Panels B and C show how this positive relationship is increasing towards the present despite
growing irrigation investments.

(2:06–2:20)
Figure 4

Based on the significance of summer precipitation on winter truffle production, we provide a
robust tool for predicting harvest yields in Spain, France and Italy.

If handled responsibly, this information can help stabilize production and pricing from regional to
international scales, thereby contributing to the maintenance of sustainable markets.

The likelihood to forecast truffle production from summer to winter, however, does not enable

long-term projections since host density and irrigation intensity in plantations can (and should) be
adapted to changing environmental conditions.

Since a drought-induced collapse of the system would also trigger biodiversity losses, a critical
review of the current plantation practices deems timely and calls for mutually beneficial and
sympathetic collaborations between academia, policy and economy at local to international levels.

(2:21–2:29)
Title page

In conclusion, we find the inventories of truffle yield from Spain, France and Italy, rather than
reflecting noise, are reliable since 1970, and that winter truffle harvests significantly depend on
previous summer rainfall.

These results question the timing and dose of existing irrigation prescriptions.

We hope this study will stimulate more research into the effects of climate change on the lifecycle
of truffles and their hosts, and the economic consequences predicted drought extremes will cause.