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MACFRUT

Fruit & Veg Professional Show - Rimini Expo Centre
8 - 10 Maggio 2019 dalle ore 9.30 alle ore 18.00

RETERURALE NAZIONALE 2014 2020

Gli eventi della Rete

Workshop

La chimica verde e la bioeconomia
PER UN'ORTOFRUTTICOLTURA SOSTENIBILE

Sala Diotallevi, Fiera MACFRUT, Rimini
8 maggio 2019

# La ricerca per un'ortofrutticoltura sostenibile: potenzialita' e sviluppi futuri


Katya Carbone

Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria
Centro di ricerca Olivicoltura, Frutticoltura e Agrumicoltura - sede di Roma

## PRODUCTION

**VOLUME ('000 tonnes)**

| FRESH FRUIT | 2015 | 2016 | 2017 | 2018p |
|---|---|---|---|---|
| Apples | 12,326 | 11,840 | 9,251 | 12,556 |
| Oranges | 6,192 | 6,364 | 6,208 | 6,400 |
| Easy Peelers | 3,060 | 3,262 | 2,925 | 3,220 |
| Watermelons | 2,915 | 3,047 | 3,219 | 3,190 |
| Peaches | 2,266 | 2,198 | 2,907 | 2,645 |
| Pears | 2,394 | 2,173 | 2,239 | 2,327 |
| Melons | 1,833 | 1,793 | 1,791 | 1,840 |
| Table Grapes | 1,709 | 1,733 | 1,640 | 1,660 |
| Nectarins | 1,488 | 1,368 | 1,457 | 1,369 |
| Other | 10,340 | 11,055 | 11,575 | 11,693 |
| **TOTAL** | **44,523** | **44,833** | **43,212** | **46,900** |

| FRESH VEGETABLES [1] | 2015 | 2016 | 2017 | 2018p |
|---|---|---|---|---|
| Tomatoes [2] | 17,725 | 17,987 | 17,427 | 17,400 |
| Onions | 6,144 | 6,587 | 6,737 | 5,160 |
| Carrots | 5,083 | 5,588 | 5,772 | 5,140 |
| Head Cabbage | 3,632 | 3,800 | 3,738 | 3,360 |
| Cucumbers | 2,697 | 2,643 | 2,725 | 2,860 |
| Peppers | 2,516 | 2,500 | 2,637 | 2,580 |
| Cauliflower | 2,296 | 2,330 | 2,436 | 2,310 |
| Headed Lettuce | 2,454 | 2,291 | 2,364 | 2,220 |
| Courgettes | 1,448 | 1,539 | 1,546 | 1,500 |
| Other | 14,046 | 14,460 | 14,435 | 12,990 |
| **TOTAL** | **58,041** | **59,725** | **59,817** | **55,520** |

*1) Excluding potatoes. 2) Including tomatoes for processing.*
***Sources: AMI-informiert.de; Eurostat***

# EUROPA: SETTORE FRESCO

## FRUTTA:

- SPAGNA E ITALIA SONO I PRINCIPALI PRODUTTORI
- MELA: 27% CIRCA DELLA PRODUZIONE

## VERDURA:

- SPAGNA E ITALIA SONO I PRINCIPALI PRODUTTORI: 42% DEL TOTALE EUROPEO
- POMODORO: 31% DELLA PRODUZIONE

# ITALIA: SETTORE FRESCO

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| Population | Area | GDP per Inhabitant | GDP Growth | Unemployment | CPI for Food |
|---|---|---|---|---|---|
| 60.5 m | 302,100 km² | 28,500 EUR | 1.6 per cent | 6.4 per cent | (2015=100) 101.3 |

## PRODUCTION

VOLUME ('000 tonnes)

| FRESH FRUIT | 2015 | 2016 | 2017 | 2018p |
|---|---|---|---|---|
| Apples | 2,280 | 2,272 | 1,704 | 2,200 |
| Oranges | 1,668 | 1,592 | 1,536 | 1,782 |
| Table Grapes | 1,045 | 997 | 926 | 933 |
| Pears | 764 | 681 | 738 | 741 |
| Melons | 595 | 632 | 606 | 610 |
| Nectarines | 736 | 657 | 688 | 580 |
| Peaches [2] | 589 | 536 | 588 | 498 |
| Easy Peelers | 752 | 698 | 650 | 486 |
| Kiwifruit | 575 | 452 | 369 | 435 |
| Others | 1,685 | 1,704 | 1,754 | 1,710 |
| TOTAL | 10,448 | 10,056 | 10,009 | 9,975 |

| FRESH VEGETABLES [1] | 2015 | 2016 | 2017 | 2018p |
|---|---|---|---|---|
| Tomatoes [2] | 1,045 | 979 | 940 | 850 |
| Fennel | 524 | 505 | 511 | 505 |
| Carrots | 513 | 531 | 487 | 499 |
| Courgettes | 494 | 554 | 541 | 490 |
| Lettuce | 477 | 475 | 466 | 420 |
| Onions | 372 | 451 | 410 | 413 |
| Cauliflower/Broccoli | 400 | 388 | 372 | 360 |
| Artichokes | 349 | 366 | 388 | 357 |
| Aubergines | 300 | 318 | 286 | 290 |
| Sweet Peppers | 380 | 271 | 250 | 225 |
| Others | 1,876 | 1,989 | 1,960 | 1,940 |
| TOTAL | 6,730 | 6,827 | 6,611 | 6,350 |

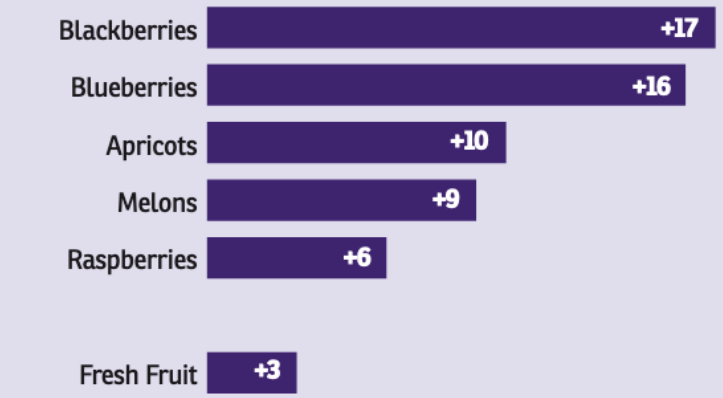
*1) Excluding potatoes. 2) Excluding products grown for processing.*
***Sources: AMI-informiert.de; CSO; Eurostat; ISTAT***

## PRINCIPALE PRODUTTORE EUROPEO:

- PERE
- NETTARINE
- ALBICOCCHE
- KIWI
- POMODORO

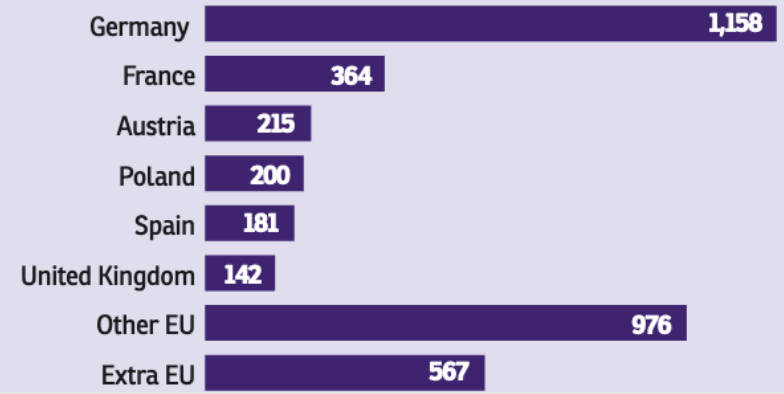
## TOP 5 FRESH FRUIT EXPORTS

VOLUME GROWTH (% p.a. 2008-2017)




## FRESH FRUIT AND VEGETABLE EXPORTS

BY DESTINATION ('000 tonnes, 2017)



# ITALIA: SETTORE TRASFORMATO

NEL 2017 OGNI FAMIGLIA HA ACQUISTATO 182 KG DI FRUTTA E 150 KG DI VERDURA (EURO 555,00)

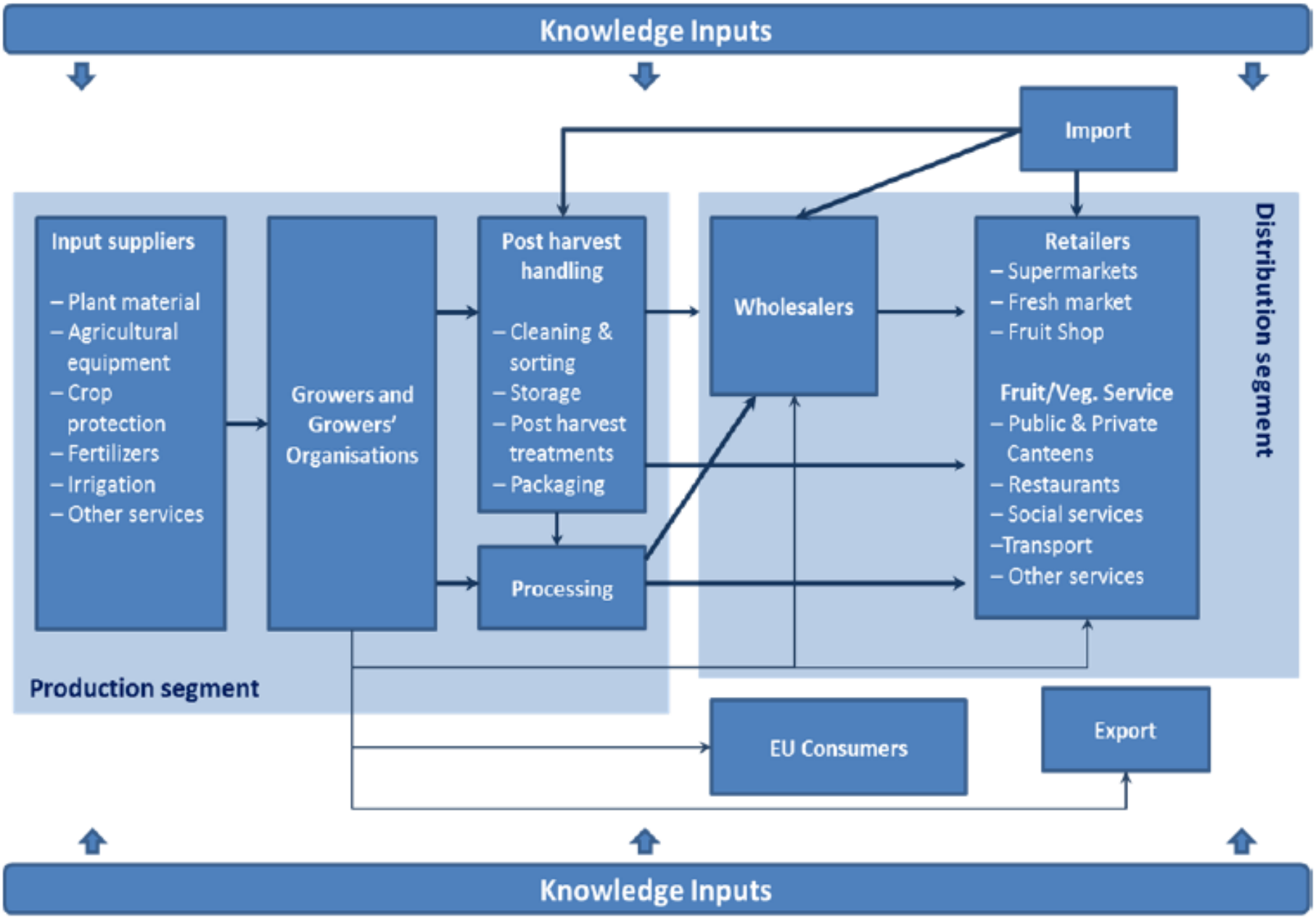
FRUTTA:
- MELE
- ARANCE
- BANANE

VERDURA:
- POMODORI
- INSALATE
- ZUCCHINE

CANALI DI VENDITA (2017):
- 61% GDO
- 13% VENDITA DIRETTA (KM 0)
- 22% FRUTTIVENDOLI

2018:
- 2° TRASFORMATORE MONDIALE DI POMODORO
- 4,7 MILIONI DI TONNELLATE DI PRODOTTO DESTINATO ALLA TRASFORMAZIONE

FIGURE 9 - THE FRUIT & VEGETABLE SUPPLY CHAIN[23].




[23] *Based on Martinez-Palou A and Rohner-Thielen (2008)*

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## Scarti dell'industria agro-alimentare

Le trasformazioni operate dall'industria agro-alimentare
producono più residui che alimenti

Infatti l'industria agro-alimentare
***considera "scarto" tra il 10 ed il 60%***
a seconda dei casi della materia trattata
con conseguenti problemi e costi di smaltimento

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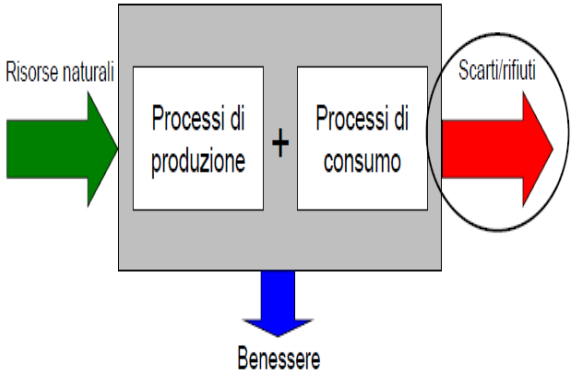
## Il ruolo dei flussi di scarto/rifiuto

spreco, scarto, riciclo nel modello bioeconomico




## Il ruolo dei flussi di spreco/scarto

spreco, scarto, riciclo nel modello bioeconomico

- Nei sistemi agroalimentari i flussi di scarto si generano a tutti I livelli del processo di produzione e consumo
  - nella fase agricola → rimanenze in campo, calamità naturali
  - nella fase di trasformazione → scarti di lavorazione, prodotti difettati, prodotti con problemi nel packaging
  - nella fase logistica → prodotti danneggiati nel trasporto, cattiva conservazione, interruzione della catena del freddo
  - nella fase distributiva → prodotti in scadenza/deperiti, prodotti invenduti per cause commerciali, rimanenze di promozioni, rimanenze e scarti ai banchi del fresco
  - nella fase di consumo → overstocking, overcooking, cattiva gestione del frigo e/o della dispensa

Table 1–Nature of potential fruit and vegetable losses and waste.

| Commodity | Nature of waste | Typical losses and waste (%) | References |
|---|---|---|---|
| Apple | Pomace, peel, and seeds | – | Gupta and Joshi (2000) |
| Banana | Peel | 35 | Gupta and Joshi (2000) |
| Citrus | Rag, peel, and seeds | 50 | Gupta and Joshi (2000) |
| Dragon fruit | Rind, seeds | 30 to 45 | Cheok and others (2018) |
| Durian | Skin, seeds | 60 to 70 | Siriphanich and Yahia (2011) |
| Grapes | Skin, stem, and seeds | 20 | Gupta and Joshi (2000) |
| Guava | Peel, core, and seeds | 10 | Gupta and Joshi (2000) |
| Jackfruit | Rind, seeds | 50 to 70 | Saxena and others (2011) |
| Mango | Peel, stone | 45 | Gupta and Joshi (2000), Mitra and others (2013) |
| Mangosteen | Skin, seeds | 60 to 75 | Chen and others (2011), Ketsa and others (2011) |
| Onion | Outer leaves | – | Gupta and Joshi (2000) |
| Papaya | Rind, seeds | 10 to 20 | Lee and others (2011), Parni and Verma (2014) |
| Passion fruit | Skin, seeds | 45 to 50 | Arjona and others (1991), Esquivel and others (2007), Almeida and others (2015) |
| Peas | Shell | 40 | Gupta and Joshi (2000) |
| Pineapple | Core, skin | 33 | Ketnawa and others (2011), Choonut and others (2014) |
| Potato | Peel | 15 | Gupta and Joshi (2000) |
| Rambutan | Skin, seeds | 50 to 65 | Sirisompong and others (2011), Issara and others (2014) |
| Tomato | Core, skin, and seeds | 20 | Gupta and Joshi (2000) |

–: Data not available.

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Il corretto smaltimento secondo la normativa vigente Europea e italiana di questi scarti (speciali) rappresenta un **costo aggiuntivo**, importante per il comparto.

se non riescono a smaltirli come speciali (ovvero produrre bioenergie o destinati ad allevamenti zootecnici) vengono sparsi nel suolo → a lungo termine avremo problemi di salubrità del suolo.

**Risorsa?**
**Opportunità di reddito?**

POSSONO COSTITUIRE UNA RISPOSTA ALLA RICHIESTA DI SOSTENIBILITÀ DELLA FILIERA

# LE SFIDE DELLA RICERCA

INDIVIDUARE LE SOLUZIONI MIGLIORI AD ELEVATA SOSTENIBILITÀ AMBIENTALE LUNGO LE FASI DI PRODUZIONE E TRASFORMAZIONE

- BIO-STIMOLANTI
- BIO-PESTICIDI
- PACKAGING
- RIVESTIMENTI EDIBILI

BIORAFFINERIE

- TECNOLOGIE DI PROCESSO E DI RECUPERO ECO-COMPATIBILI
- AGRICOLTURA DI PRECISIONE

### 9.4.3 How R&D in the Fruit and Vegetable sector will deliver on EU environmental issues

- R&D targeted at minimizing chemical residues, increasing the use of biological pest control and the use of novel and alternative technologies to chemical regulation of fruit trees and vegetable plants will reduce the impact of the sector on the environment.
- R&D focused on delivering novel cultivars with increased pest and disease resistance will reduce the use of chemicals throughout the fruit and vegetable chain.
- R&D focused on delivering improved monitoring and forecasting through the use of smart technologies will minimize the use of chemicals and maximize the efficiency of chemicals.
- R&D delivering precision growing techniques, including real time cultural management for easy, reliable, accurate assessment of vital crop statistics, real time adjustment of production factors and precise use of water and fertilizer, and adoption of cultural practices capable of reducing resource inputs will improve the balance between the production system and the environmental resources.
- Innovative solutions for delivering in-the-field assessment of storage potential for reliable and longer storability will reduce fruit and vegetable loss during the chain.
- Innovative technologies to produce more with less; to increase implementation of sensors, artificial intelligence, intelligent management systems and remote sensing technologies will minimize the EU fruit and vegetable sector footprint.

- R&D to underpin the delivery of fruit and vegetable and fruit- and vegetable-based products with enhanced functional health properties via innovative production practices; including photo-selective films to enhance the production of pigments, use of natural compounds, modification of resource input to regulate beneficial properties will provide added value.
- R&D focused on managing and responding to climate changes, through increased knowledge and detection of new and emerging pests and diseases, validation methodologies for carbon and water footprint will secure the EU fruit and vegetable industry into the future.
- R&D delivering new detection tools for climate change issues; including smart irrigation systems, improved and new warning systems, and innovative diagnostic systems will minimize the footprint.
- R&D to reduce energy inputs via reduced chemical and fertilizer applications, adoption of soil and plant management techniques to enhance the soil natural fertility, deliver technologies to enable orchards to become effective sites for sequestering carbon and providing "green shares" will enhance the natural capital of the EU.
- Reducing waste of produce at all points of the supply chain will increase efficiencies.
- Innovative "omics" approaches to control tree behaviour and implementation of "soft-technologies" will increase competitiveness.
- Introduction of "omics"-based breeding, including development of new ideotypes addressing consumer preferences, providing growers with varieties that are easier to grow and manage along the chain, while preserving superior taste attributes will secure the EU fruit and vegetable supply.

- Innovative processed fruit and vegetable and fruit- and vegetable-products tailored to consumer segments; young, elderly, overweight, diabetics etc. Nano-encapsulation of bioactive components for enhancing functional properties of fruit juices and purees; flash vacuum expansion in processing for juice and puree; membrane technology in concentrated juice production; non-thermal product preservation (high hydrostatic pressure, pulsed electric field, ozonation, ultrasonication); edible coatings to prevent browning, microbial decay and losses of bioactive components and to enhance texture and sensory properties of ready-to-eat cut fruit and vegetables; utilization of processing wastes for industrial raw materials and biogas production will increase the consumption of EU fruit and vegetables.

# LE SFIDE DELLA RICERCA

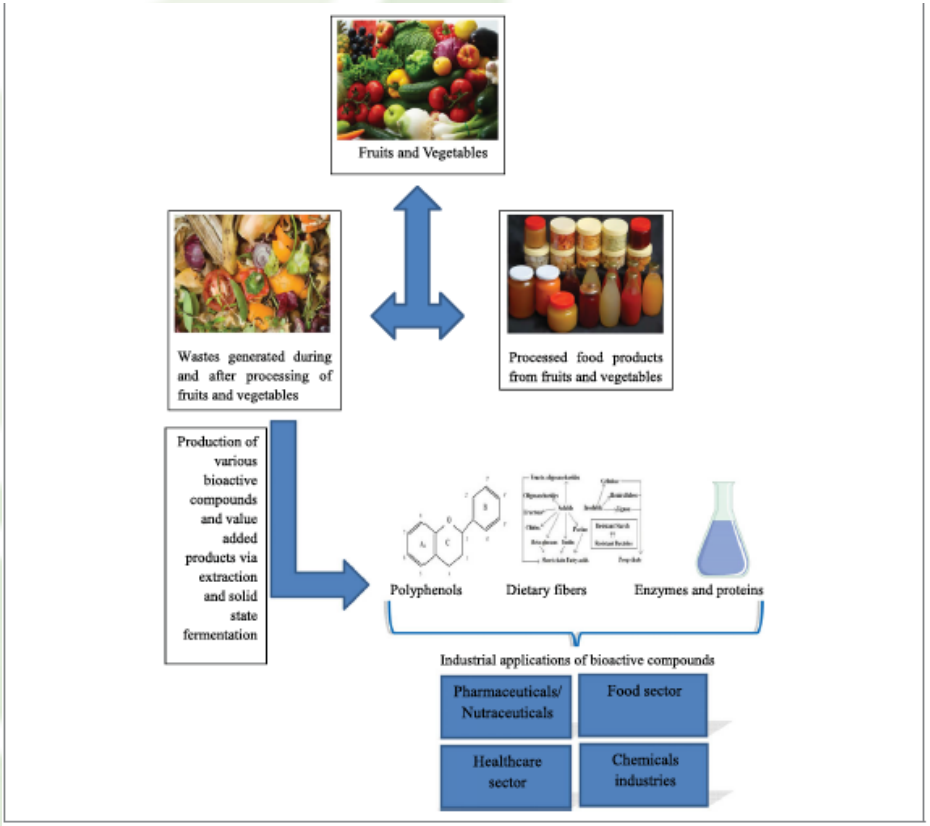



Figure 1 –Graphical illustration of the fate of fruit and vegetable wastes.

## AGRI-FOOD WASTE AS A CHEAP AND VALUABLE SOURCE OF INNOVATIVE MATERIALS

Katya Carbone, Mariano Paliotta, Roberto Ciccoritti

*Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria*

***Research Centre for Olive, Citrus and Tree Fruit**, Via di Fioranello, 52 - 00134 Rome, Italy*

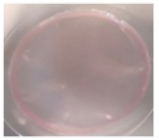
Agri-food waste extracts have emerged as effective alternatives for eco-friendly and cost-effective synthesis of innovative materials, like bioplastics for packaging; edible films/coatings to extend the shelf life of foodstuffs and, at the same time, to enrich their nutritional value; encapsulation systems for drug delivery, and bio-inspired nanomaterials.

**New materials developed from fruit processing waste**

***Green materials***


Freeze-dried fruit waste


Fruit waste extracts


Functionalized bioplastics


Edible films


Edible coatings

# L'idea

**Scarti e sottoprodotti agroindustriali come biofattorie per la produzione di bioprodotti innovativi**

ammendanti
combustibili
rivestimenti edibili
integratori alimentari
bioplastiche
nanomateriali
cosmetici
mangimi funzionali
novel foods

# GRAZIE PER L'ATTENZIONE


GRUPPO CBA CREA OFA SEDE DI ROMA
V. MACCHIONI, A. DE ANGELIS, C. CAMARRI
PROF.SSA L. MICHELI (UTV)
PROF.SSA I. CACCIOTTI (UNICUSANO)

*Le idee migliori non vengono dalla ragione, ma da una lucida, visionaria follia.*
*E.R.*

KATYA.CARBONE@CREA.GOV.IT