Piano Nazionale di Ripresa e Resilienza (PNRR)

ADaptation in Agriculture
5-12-2022

https://www.mur.gov.it/it/pnrr/missione-istruzione-e-ricerca

Missione 4, Componente 2, Investimento 1.4 del PNRR: Potenziamento strutture di ricerca e creazione di "campioni nazionali" di R&S su alcune Key enabling technologies

Centro Nazionale per le Tecnologie dell'Agricoltura (AGRITECH)

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CREA-Cerealicoltura e Colture Industriali
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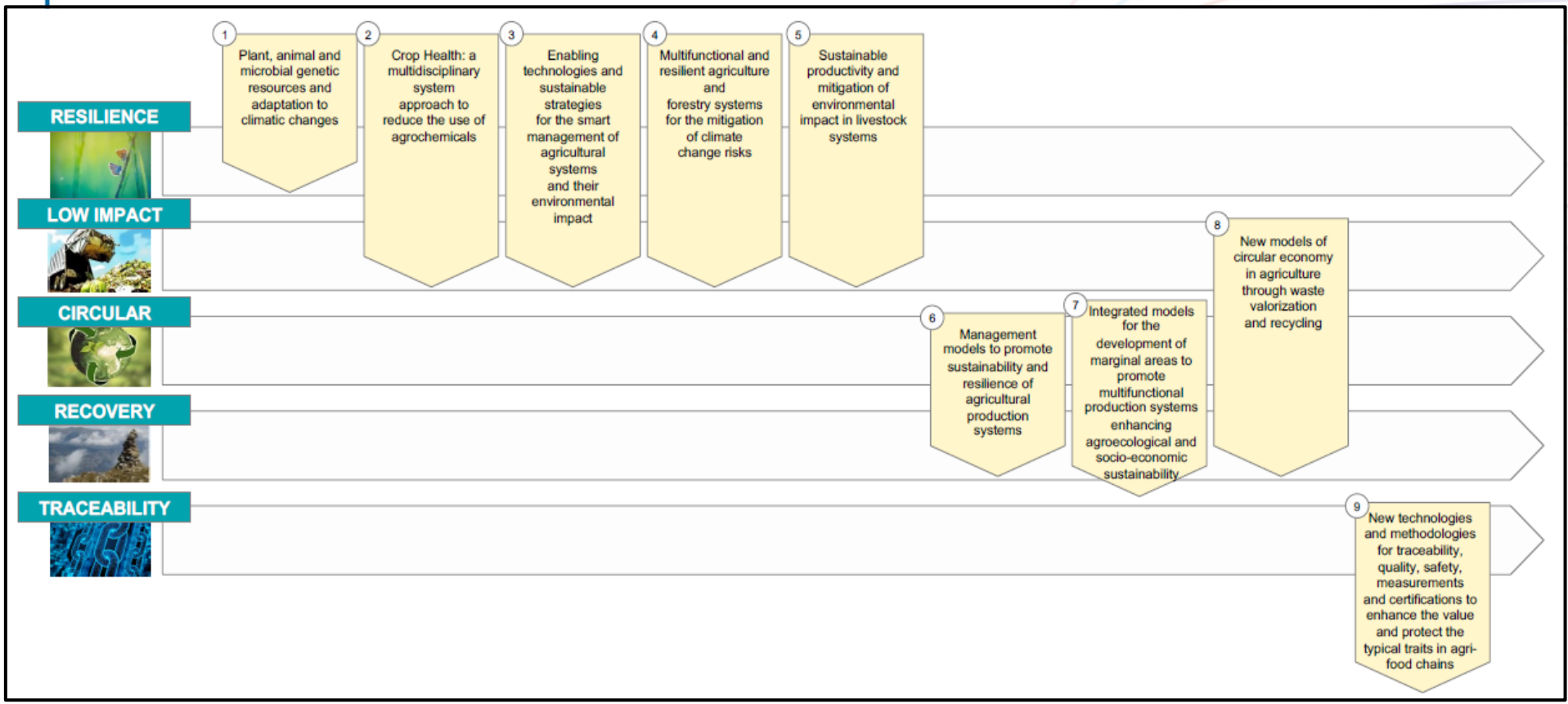
Le Aree Tematiche (Spokes) e gli Obiettivi di Agritech

The European Green Deal challenge:

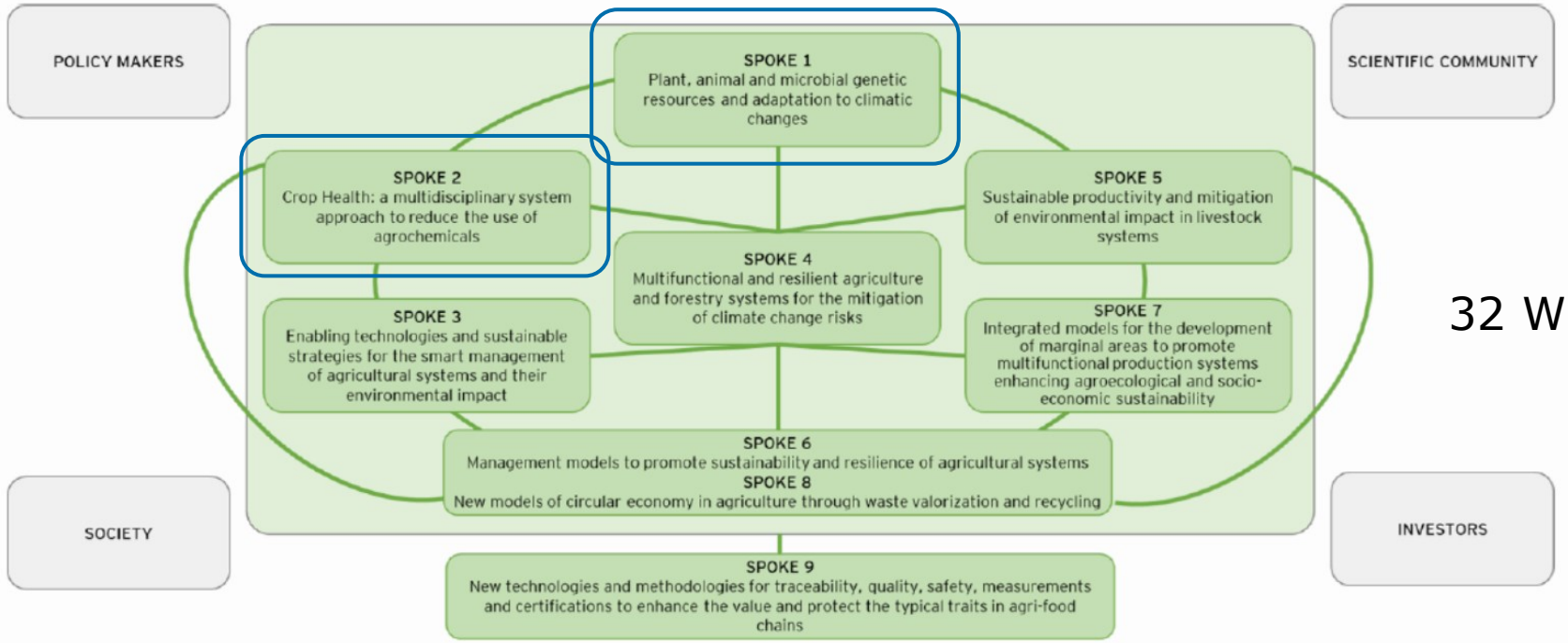
Producing sufficient and safe food for a growing population without over-exploiting natural resources by finding solutions which are sustainable in the long term.

- Ensuring nutritious, healthy and sustainable food for all
- Setting up full circularity of food and agricultural systems
- Restoring diversity in our food, farm and social systems



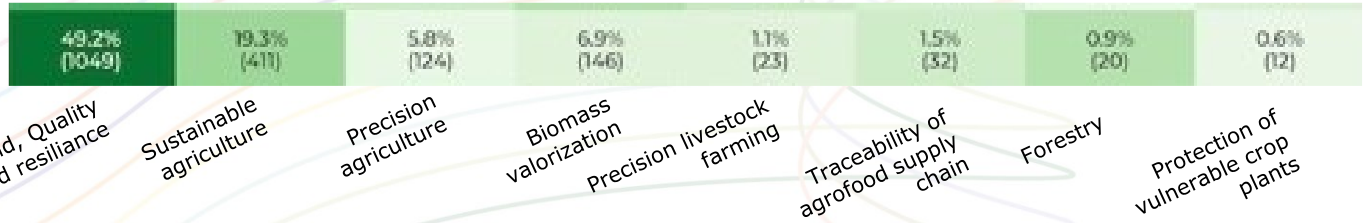
Struttura HUB-Spoke: proponente Università degli studi di Napoli Federico II, 28 Università. 8 Enti di ricerca, 15 aziende

Interazioni tra Spokes – approccio multidisciplinare



32 WPs

CREA – Ref. Per CN Agritech Dr. Perri
Spoke 1 (Referente Dr. Cattivelli),
Spoke 2 (Referente Dr. Roversi)



Finanziamento concesso: 320,070.095,50 euro di cui il 45% al Sud

Agritech – Spoke 1

Agritech – Spoke 1 Referente Dr. Luigi Cattivelli,
CREA-Genomica e Bioinformatica

Spoke Leader: CNR

1 - Plant, animal and microbial genetic resources and adaptation to climatic changes

WP	**1.1** Plant, animal and microbial genetic resources: mining for resilience	**1.2** Dissecting morpho-physiological and molecular mechanisms of adaptation	**1.3** Developing advanced genotypes with improved resilience
GOAL	Disclose genetic diversity underlying adaptation (CHARACTERIZE)	Identify mechanisms and players of resilience (UNDERSTAND)	Generate and validate improved genotypes (BREED)

Work package number	1.1	**Lead beneficiary**	UNIBO
Work package title	Plant, animal and microbial genetic resources: mining for resilience		
Start month	1	**End month**	36

M1.1.1 Identification and collection of material for genetic/genomic analysis: ≥ 30 accessions for at least 8 plant/animal/microbial species (M9)
M1.1.2 Defining a workflow/protocol for data management and analysis (including data policy): development of specific protocols/datasheets for standardized submission of different omic data (M18)

M.1.2.1 Genotypes segregating for loci/candidate genes for stress adaptation, quality and yield identified from at least 6 population/mutant/strain screenings (M24)
M.1.2.2 Datasets obtained from ≥ 6 plant/animal/microbial organisms exposed to different environmental conditions (≥ 3) (M20)
M.1.2.3 Estimation of genomic breeding values and structured genomic breeding plans (M30)

M.1.3.1 Validation of mutants/genotypes in at least 3 traits of interest per 3 plant/animal/microbial species and selection of mutated progeny (M24)
M.1.3.2 Definition of the experimental strategy for field-testing of novel genotypes: protocols for testing in at least 4 different locations/conditions (M24)

Il Centro CREA - CI in Agritech

WP - 1.1 Plant, animal and microbial genetic resources: mining for resilience		
T1.1.1 - Genome-wide analysis of genetic diversity, pan-genome reconstruction and modelling of evolvability in response to CC	T1.1.2 - Comparing phenotypic diversity of genetic resources through phenomic and multi-omic approaches	T1.1.3 - Germplasm storage and management

WP - 1.2 Dissecting morpho-physiological and molecular mechanisms of adaptation			
T 1.2.1 - Linking phenotype and genotype: discovery of loci/genes/alleles for traits of interest	T 1.2.2 - Assessing epigenomic/transcriptomic/proteomic/metabolomic/volatilomic changes underpinning resilience/adaptation to stress conditions	T 1.2.4 - Mechanisms underlying plant-microbial interactions beneficial for tolerance	T 1.2.5 - Strategies and tools for genomic prediction and crop simulation models

- ✓ Combining genomic and phenomic information for identification of novel genes through GWAS and positional cloning
- ✓ High throughput phenotyping and metabolomics characterization for precise dissection of crop genetic diversity

Agritech – Spoke 1 CREA-Cerealicoltura e Colture Industriali, sede Foggia Prof. Nicola Pecchioni
@: nicola.pecchioni@crea.gov.it

Agritech – Spoke 2

Agritech – Spoke 2 Referente Dr. Pio Roversi, CREA-Difesa e Certificazione

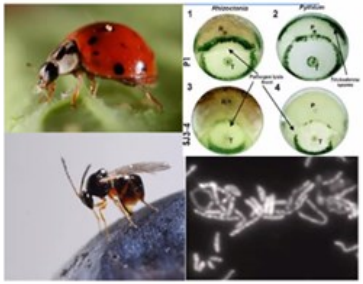
Spoke Leader: UNINA

2 - Crop Health: a multidisciplinary system approach to reduce the use of agrochemicals

WP	**2.1** Agroecology and landscape management to reinforce ecosystem services	**2.2** Alternatives tools and strategies to reduce the use of synthetic pesticides and fertilizers	**2.3** Smart technologies towards a sustainable "zero pollution" in agriculture
GOAL	Enhance natural resilience of agroecosystems	Provide new tools for promoting sustainable plant growth and protection	Implement cutting-edge technologies to reduce the use of agrochemicals

- ✓ To provide alternative tools for plant protection and nutrition/growth promotion that can replace the use of synthetic agrochemicals.
- ✓ To enhance plant defense and nutrition/growth through genetic improvement, the use of microorganisms and plant signaling molecules.
- ✓ To use biocontrol agents both as organisms and as source of biopesticides and biostimulants, which will be also obtained from different biomasses.
- ✓ To develop formulation nanotechnologies that will allow safe and efficient delivery of biopesticides and biostimulants.
- ✓ To develop non-chemical pest control strategies.

Task 2.2.3: Biological control



Duration: M1 – M36

Task leader:
- Francesco Vinale UNINA
- Riccardo Baroncelli UNIBO
- Alberto Pozzebon UNIPD

Partners involved (7):
- UNINA
- UNIBO
- UNICT
- UNIPD
- CREA
- UNITO
- CAI

Task 2.2.4: Biopesticides and Biostimulants

Duration: M6 – M36

Task leader:
- Vittoria Catara UNICT
- Patrizia Falabella UNIBAS

Partners involved (9):
- UNINA
- UNIBO
- UNICT
- UNIPD
- CREA
- UNITO
- CAI
- UNIBAS

Task 2.2.5: Non chemical methods of pest control

Duration: M6 – M30

Task leader:
- Francesco Spinelli UNIBO
- Vladimiro Guarnaccia UNITO

Partners involved (5):
- UNINA
- UNIBO
- UNITO
- CREA
- UNIBAS

Task 2.3.4: Development abd validation of sustainable IPM plants

Durata: M1-M36

Task leader:
- Claudio Cristiani [CAI]
- Carlo Duso [UNIPD]
- Francesco Caracciolo [UNINA]

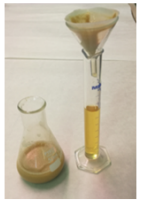
Partners involved (6):
- UNINA
- UNIPD
- UNITO
- CREA
- UNICT
- CAI

CREA-CI, sedi Caserta e Bologna Dr. Ernesto Lahoz
@: ernesto.lahoz@crea.gov.it (sede Caserta)
@: laura.righetti@crea.gov.it (sede Bologna)

Il Contributo del CREA – CI Task 2.2.4

Biopesticidi

Biostimolanti

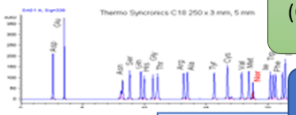


Biomasse vegetali
(Brassicaceae, piante oleaginose)

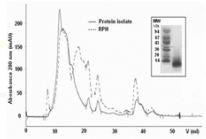
1. Preparazione di estratti

Idrolisi proteica

Estratti arricchiti in molecole bioattive
(Glucosinonati e loro prodotti di idrolisi)



Estratti arricchiti in peptidi ed amino acidi
(con altre molecole bioattive)



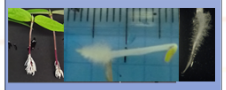
2. Caratterizzazione chimica degli estratti

Valutazione attività antifungina

Valutazione attività biostimolante

3. Prove di attività

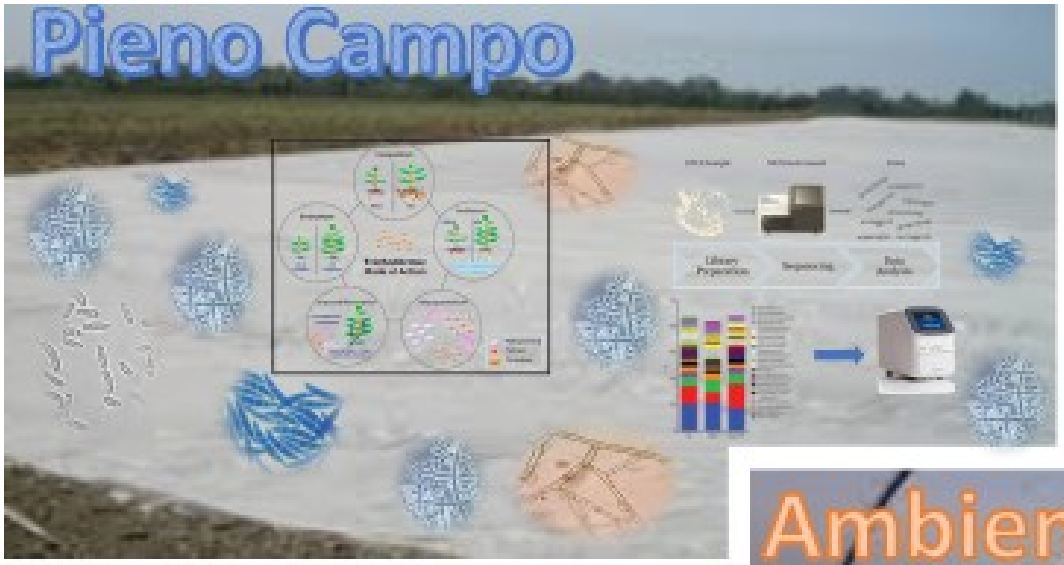
- ***in vitro*** (*baseline*)
- ***in vivo*** in condizioni controllate (cella climatica/in serra)
- ***In vivo*** in campo (prove in parcelle sperimentali)
- ***in vitro*** ormon-simile



- ***in vivo*** in condizioni controllate (cella climatica/in serra)
- Valutazione in pianta di marker di induzione di resistenza a stress (attività enzimatiche e/o analisi di espressione)

Altri Centri coinvolti CREA-OF,CREA-DC, CREA-ZA, CREA-OFA

Il Contributo del CREA – CI Task 2.2.5



Effetto sulle comunità fungine patogene e benefiche rispetto alla differente copertura del suolo (teli di polietilene *vs* SOLIN)

Effetto sulle comunità di lepidotteri impollinatori della differente copertura del suolo

Non-chemical methods of pest control

Altri Centri coinvolti CREA-FL,CREA-DC