The past….
The Present:
• Risks in agriculture
• How to assess the risk in the sector
• Ways forward
• 70 per cent of all (352 million) child labour employed in agriculture
• 80 million children aged 5-14 work in the worst forms of child labour in Agriculture (hazardous work, forced and bonded labour, etc)
• Agricultural workers are among the groups with the highest incidence of poverty in many countries
• 95% of the agricultural workers have no access to any labour inspection system
• The majority of waged agricultural workers are excluded from social protection
RISK FACTORS

- Solar radiation
- Pesticides and other chemicals
- Noise and vibrations
- Accidents
- Prolonged working times
- Musculoskeletal risk
- Extreme temperatures
• There are no reliable source of data;
• ILO estimate that half of fatal occupational injuries in the world are attributable to agriculture;
• This mean that around 170,000 agriculture workers dies every year due to occupational accidents.
• Assuming that non fatal accidents in agriculture are 50% of the total burden of non fatal occupational accidents (ILO estimate 263 million cases per year):
• More than 130 million of occupational injuries yearly could be linked to agriculture.
• 130 million accidents in agriculture
• 20.7 millions injured persons in road accidents (WHO data)

• WHERE IS THE PRIORITY??
Occupational injuries in agriculture

- Developed countries most of fatal occupational injuries in agriculture are tractor or machinery related (USA, Canada, Finland);
- In developing countries injuries are not so frequently machinery related. In Tanzanian rural areas cuts and stabs are the most frequent injuries;
- Males are more frequently victims in developed as well as in developing countries. Gender ratio male to female 4.5:1 to 11:1.
• Data on occupational and work related diseases less certain
• World Bank estimated that in 2001 there have been 1,687,061 fatal work-related diseases and among them 438,480 deaths caused by dangerous substances
• Analogue to occupational injuries, one could estimate that half of fatal work-related diseases could be linked to agriculture (around 840,000)
The number of occupational diseases reported is very low.

EU data suggests that the most common occupational diseases in the agriculture are:
- Musculoskeletal;
- Respiratory diseases;
- Skin diseases;
- Sensory organ diseases.
ALL THE TYPICAL OCCUPATIONAL RISKS ARE PRESENT
HOW TO ASSESS/MANAGE?
Why do farmers often choose to accept risk?

1) Consistent exposures to risk with positive outcomes makes risk normal.  
   \textit{Risk becomes "Normal"}  

2) Risk taking is often modeled/encouraged by significant others.  
   \textit{Risk becomes part of a "Farming Identity"}  

3) The pressure to reduce costs and save time makes risk appear cost-effective.  
   \textit{Risk becomes "Cost-Effective"}  

\textit{Source: Sorensen, J, 2009}
Risk assessment in agriculture: a challenge

1. Non univocal jobs

- Maintenance
- Application of agrochemical
- Animal breeding
- Use of machineries
- Forestry / garden maintenance

1. Fragmentation in the territory
### RISK ASSESSMENT (2)

#### 3. Overlapping living/working environments
- Occupational contaminants in home
- Youngest/elderly at work
- Pregnant women at work
- No control on working time (long working hours)

#### 3. Daily / yearly variation of the activities
- Multi task profile of the agricultural worker
- Intermittent exposure to several risk factors
- Indoor vs outdoor
- Meteorological conditions
- Difficulties in identifying the main risk/s
WHY MEASURING FOR RISK ASSESSMENT?

Measures represent single spots in a map.
We need the map, not the spots ("Exposure Profile").
Extrapolation – generalization – synthesis.
Otherwise, measures are not useful (apart for the single situation considered).
Measuring may not be the best choice. How to manage?

THE EMERGING NEED: PRODUCING EXPOSURE/RISK ESTIMATES
Exposure and risk profile: what is?

A reliable description of the main risk determinants
In specific exposure and risk scenarios
With the possibility of assessing the risk without doing measures
Examples: the risk deriving from pesticide exposure in fungicide application in vineyards; the risk of muscle skeletal disorders in cow milking, etc…
Such an evaluation can be done also in absence of measurements.
Create and make available (on line?) collections of specific risk/exposure conditions in typical agricultural scenarios (noise, vibrations, biomechanical risks, agrochemicals....)
Creation of profiles. Case study: pesticide application
### Identification of the principal exposure determinants

<table>
<thead>
<tr>
<th>MI</th>
<th>APPL</th>
</tr>
</thead>
</table>
| 1. Mixing and loading:  
  - Type of formulation  
  - Product concentration  
  - Number loadings/day  
  - Crop surface  
  - Tank size | 2. Application:  
  - Crop (high, low..)  
  - Dose  
  - Application modalities  
  - Time  
  - Devices |
| RE-ENTRY | REPAIR |
| 3. Re-entry:  
  - Crop density,  
  - Working hours  
  - Time elapsed since application  
  - Quantity of hand work done on the crop (example: vineyard)  
  - Disloadgable foliar residue | 4. Maintenance & cleaning:  
  - Conditions of machineries,  
  - Age,  
  - Frequency  
  - Unanticipated events |
The approach

“In-field” studies used to create and validate the algorithm
## Examples of scores

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPLICATION DOSE</td>
<td></td>
</tr>
<tr>
<td>&lt; 0.4 Kg/ha</td>
<td>1</td>
</tr>
<tr>
<td>0.4-1 Kg/ha</td>
<td>2</td>
</tr>
<tr>
<td>1 - 2 Kg/ha</td>
<td>3</td>
</tr>
<tr>
<td>&gt; 2kg/ha</td>
<td>4</td>
</tr>
<tr>
<td>TREATED AREA</td>
<td></td>
</tr>
<tr>
<td>&lt; 0.1 ha</td>
<td>1</td>
</tr>
<tr>
<td>0.1 – 0.9</td>
<td>2</td>
</tr>
<tr>
<td>1 – 2ha</td>
<td>3</td>
</tr>
<tr>
<td>&gt;2ha</td>
<td>4</td>
</tr>
<tr>
<td>A.S. CONCENTRATION</td>
<td></td>
</tr>
<tr>
<td>&lt; 30%</td>
<td>1</td>
</tr>
<tr>
<td>30 – 60%</td>
<td>2</td>
</tr>
<tr>
<td>60 – 80%</td>
<td>3</td>
</tr>
<tr>
<td>&gt; 80%</td>
<td>4</td>
</tr>
<tr>
<td>FORMULATION</td>
<td></td>
</tr>
<tr>
<td>Water-soluble bags</td>
<td>1</td>
</tr>
<tr>
<td>Wettable granules</td>
<td>2</td>
</tr>
<tr>
<td>Liquid</td>
<td>3</td>
</tr>
<tr>
<td>Powder</td>
<td>4</td>
</tr>
<tr>
<td>APPLICATION RATE</td>
<td></td>
</tr>
<tr>
<td>&lt; 3 day/year</td>
<td>1</td>
</tr>
<tr>
<td>3 – 6 day/year</td>
<td>2</td>
</tr>
<tr>
<td>7 – 9 day/year</td>
<td>3</td>
</tr>
<tr>
<td>&gt; 0 = day/year</td>
<td>4</td>
</tr>
<tr>
<td>MACHINERY</td>
<td></td>
</tr>
<tr>
<td>Computer based system</td>
<td>1</td>
</tr>
<tr>
<td>Motor pump</td>
<td>2</td>
</tr>
<tr>
<td>Low pressure knapsack pump</td>
<td>3</td>
</tr>
<tr>
<td>Duster</td>
<td>3</td>
</tr>
<tr>
<td>Atomizer</td>
<td>4</td>
</tr>
<tr>
<td>KIND OF CROP</td>
<td></td>
</tr>
<tr>
<td>Low height/low density</td>
<td>1</td>
</tr>
<tr>
<td>Low height/high density</td>
<td>2</td>
</tr>
<tr>
<td>High/low density</td>
<td>3</td>
</tr>
<tr>
<td>High/high density</td>
<td>4</td>
</tr>
</tbody>
</table>
(Proper) use of PPE
Training & Education
Conditions of equipment
A possible approach for the definition of toxicity index is the use of toxicity classification, labels and risk phrases as proxy of toxicity.

<table>
<thead>
<tr>
<th>RISK PHRASES</th>
<th>SCORE</th>
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</thead>
<tbody>
<tr>
<td>R22 DANGEROUS IF SWALLOWED</td>
<td>1</td>
</tr>
<tr>
<td>R36 EYE IRRITANT</td>
<td></td>
</tr>
<tr>
<td>R20 DANGEROUS IF INHALATED</td>
<td>2</td>
</tr>
<tr>
<td>R25 TOXIC IF SWALLOWED</td>
<td></td>
</tr>
<tr>
<td>R23 TOXIC IF INHALATED</td>
<td>3</td>
</tr>
<tr>
<td>R43 SKIN SENSITIZER</td>
<td></td>
</tr>
<tr>
<td>R26 HIGHLY TOXIC IF INHALATED</td>
<td>4</td>
</tr>
<tr>
<td>R62 CAN REDUCE FERTILITY</td>
<td></td>
</tr>
</tbody>
</table>
## Toxicity Index

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Toxicity index</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low</strong></td>
<td></td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Uncertain, probably slight</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Uncertain, probably not slight</td>
</tr>
<tr>
<td><strong>High</strong></td>
<td></td>
</tr>
</tbody>
</table>

### The output: an evaluation grid

- **Low** exposure:
  - **Low:** Slight
  - **High:**
- **x-y** exposure:
  - **Low:** Slight
  - **High:**
- **y-z** exposure:
  - **Low:**
  - **High:**
- **High** exposure:
  - **Low:**
  - **High:**
Activity done
Indicator (ie: strain index for repetitive motion)
Time spent in the activity
……other variables…..
PROFILE OF BIONECHANICAL RISK
Activity done
Indicator: noise/vibration caused by the machinery
Time spent in the activity
.......other variables.....
PROFILE OF PHYSICAL RISK
(available also collections of typical levels of exposure in the web)
Similar approach is possible
Risk assessment/management is mandatory
Step 1: training trainers

Focus on risk perception, changes of attitudes, motivation and behaviour
Step 1: training trainers

Focus on risk perception, changes of attitudes, motivation and behaviour
STEP 2: reaching the workers and their families at the workplace (linked with health surveillance: Basic Occupational Health Services for farmers, with health centers and experts such as: Nurse, Doctor Physiotherapist, Safety Engineer + access to mental health support)