Pyrrolizidine Alkaloids – Quality Control from Field to Factory

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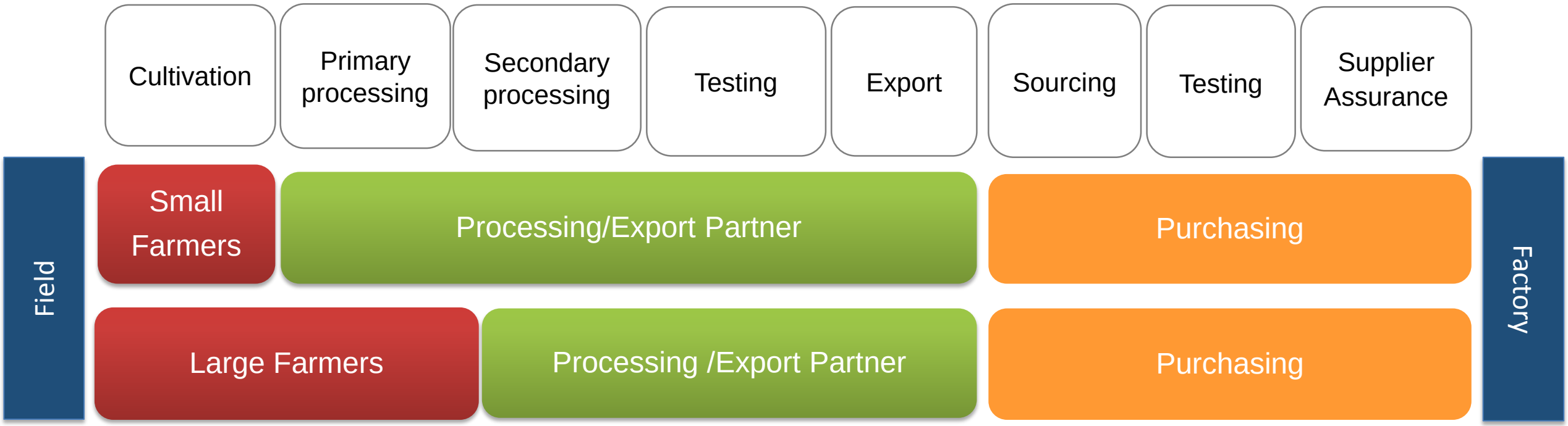
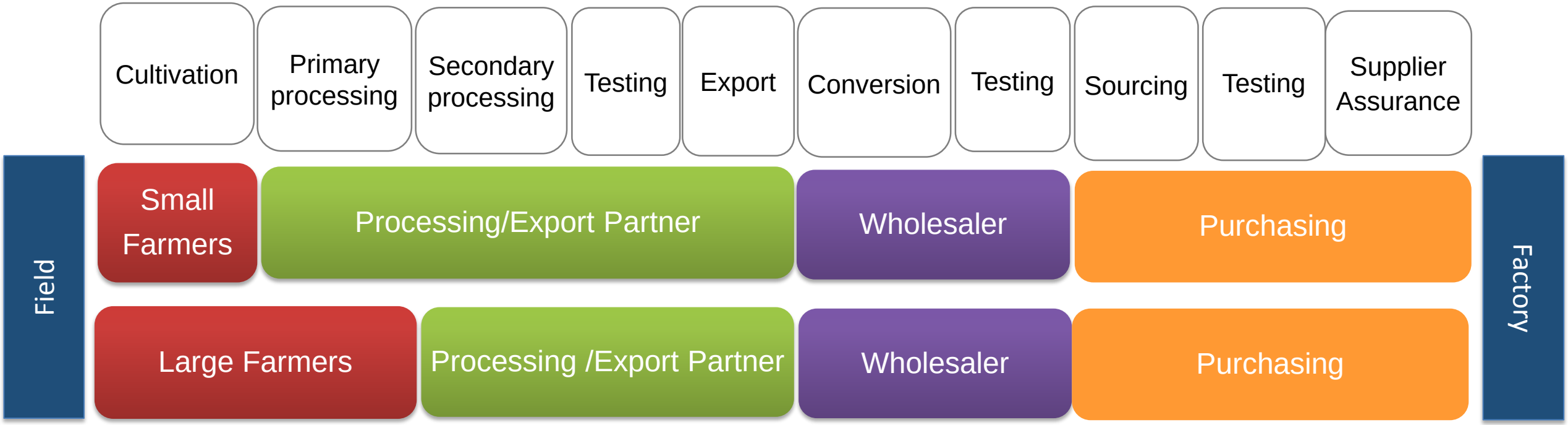
Supply chain

Source 152 organically certified herbs from 32 countries

Supply Chain – closer to the source



Supply Chain – one step removed



Cultivation – the field

Large farms

Small farms

Cultivation - the field

Cultivated

Wild

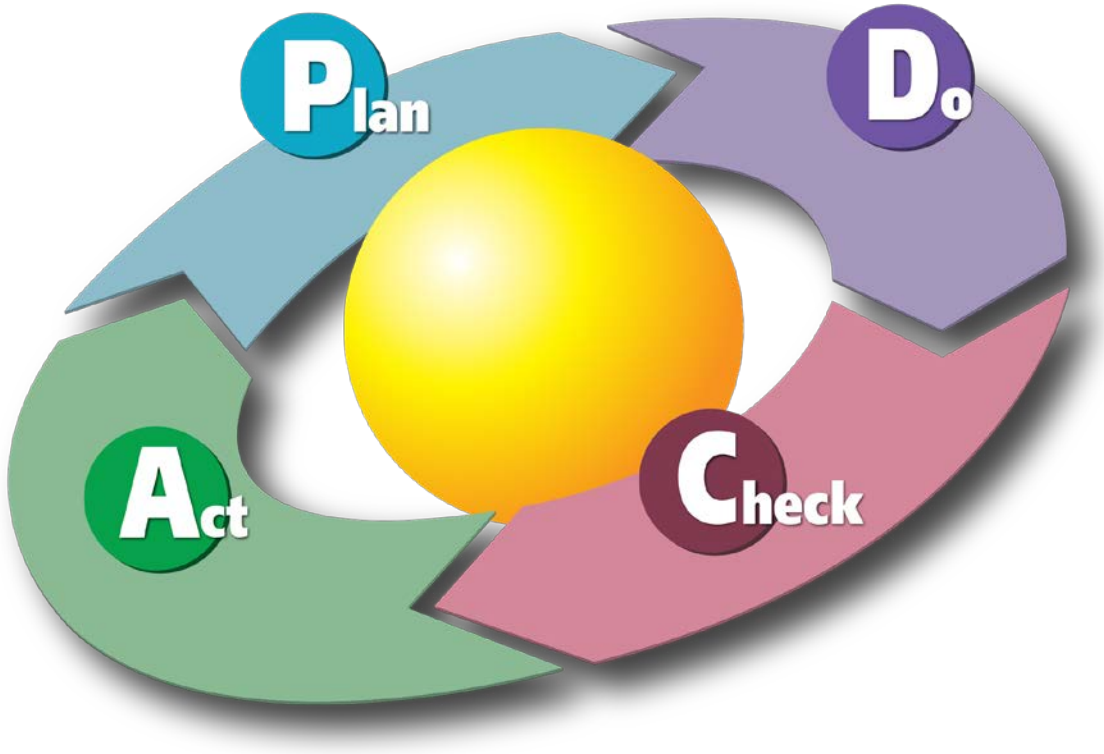
Processing

Established

Emerging

Four step approach

1. Plan – how to target PA's
2. Do - collect data on PA's
3. Check – analyse data on PA's
4. Act – implement PA improvements



Planning – the strategy for PA control

- What are my risks?
- What do I need to target?
- How should I go about this?
- Agree the best approach and plan for data collection

Doing – how we collect data on PA's

Establish the identity

- Prepare herbarium samples
- Take macro photographs
- Take samples for PA testing

Doing – how we collect data on PA's

Documenting the data

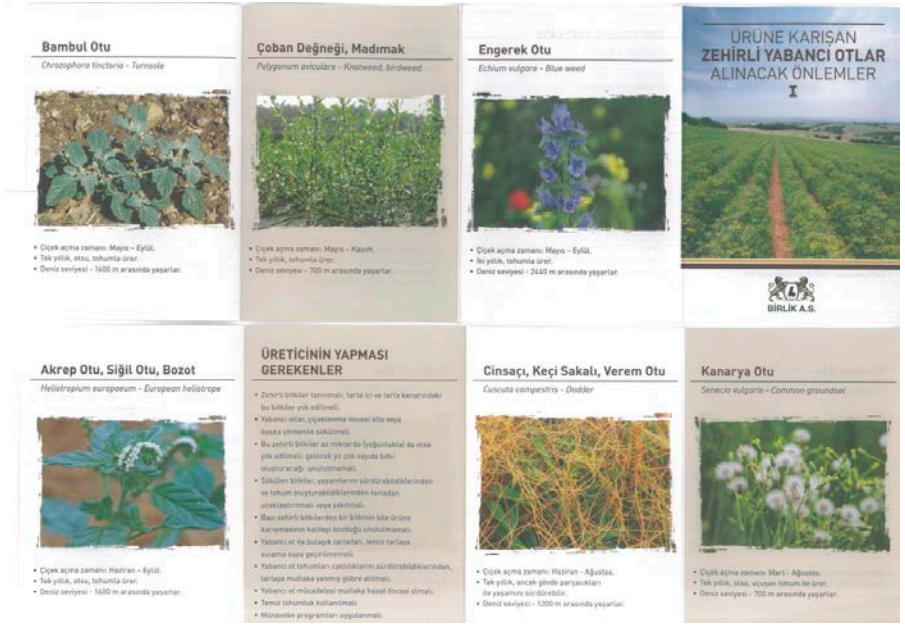
- Confirmed identification
- Research common weed flora
- Field reports
- Create a reference library

Checking – analysing the data on PA's

- Identify herbs at most risk of PA contamination
- Risk mitigation strategy
- Forward testing and surveillance plan

Actions – Education and awareness

- Monographs for identification
- Reference materials such as leaflets



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Hazardous Plants Monograph

Pyrrolizidine Alkaloids

Known for short as PAs, Pyrrolizidine alkaloids are a form of naturally occurring compounds produced by plants as a defense mechanism against insect herbivores. PAs are not only toxic to insects; they can also be very harmful – sometimes fatal – to humans (and many animals). There have been a number of cases of poisoning caused by contaminated herbal products. All herb growers must make efforts to identify plants that contain PAs and ensure that they do not come into contact with raw materials that will be used in herbal products.

It is estimated that PAs occur in 3% of the world's flowering plants, primarily in three plant families: Asteraceae, Boraginaceae and Fabaceae. These include many common weeds that may be found growing in organic fields. Crops that are harvested by tractor are of highest risk, as there is no means of discriminating between the target herb and rogue weeds growing in the field.

Asteraceae Family:

Also known as the daisy or sunflower family, the Asteraceae family is the biggest family of flowering plants in the plant kingdom.

Genera of particular concern include *Senecio*, *Eupatorium* and *Ageratum* (see photos below).

It is estimated that Ragwort poisoning is responsible for 2000-6000 horse deaths per year.

Examples of species in the Asteraceae family that contain PAs

Eupatorium cannabinum **(Hemp-agrimony)**

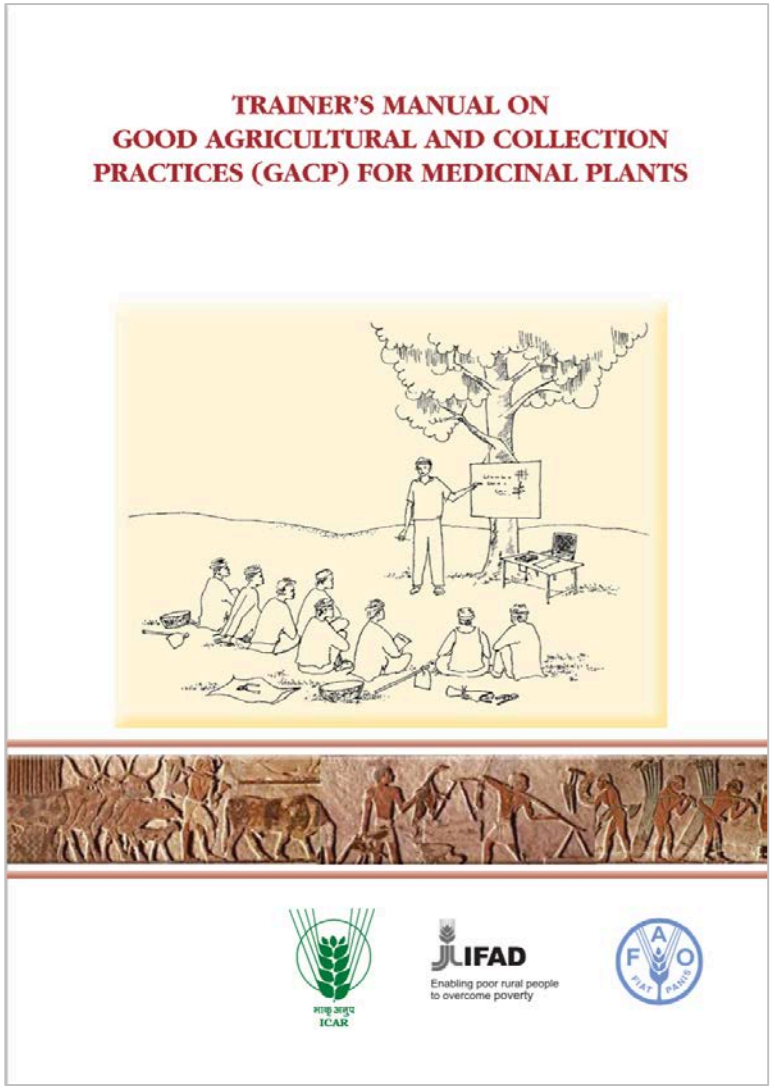
Jacobaea vulgaris **(Common Ragwort)**

Senecio vulgaris **(Common Groundsel)**

Ageratum conyzoides **(Chickweed / Goatweed)**

Actions – Education and awareness

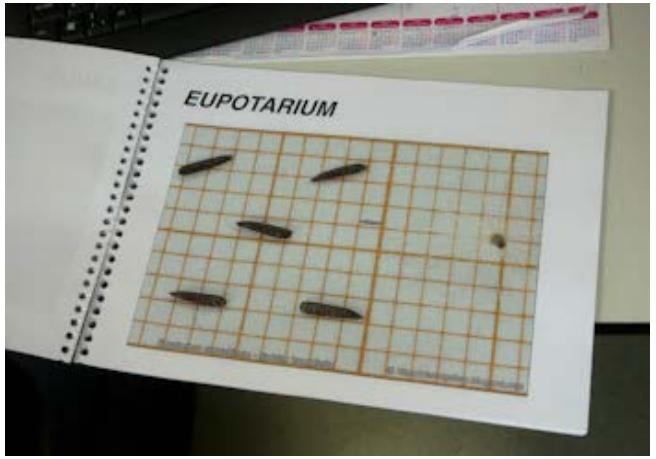
- Training farmers on what to look out for
- Developing more robust GACP



Actions - surveying the terrain

Actions – in processing

Starting materials



In-process control

Actions – harvesting practices

Act - longer supply chains

Best practise

Industry insight

Supplier assurance

Some final reflections

- No quick fix to PA contamination
- More robust testing and assurance
- Supply chain insight is key
- Collaborative effort

Thank You

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