proactima
PRO-ACTIVE MANAGEMENT

Visualisering av hudeksponering

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PREPARED.

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DERMAL EXPOSURE ASSESSMENT TECHNIQUES

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Abstract—Exposure of the skin to chemical substances can contribute significantly to total dose in many workplace situations, and its relative importance will increase when airborne occupational exposure limits are reduced, unless steps to reduce skin exposure are undertaken simultaneously. Its assessment employs personal sampling techniques to measure skin loading rates, and combines these measurements with models of percutaneous absorption to estimate absorbed dose. Knowledge of dermal exposure pathways is in many cases fundamental to hazard evaluation and control. When the skin is the primary contributor to absorbed dose, dermal exposure measurements and biological monitoring play complementary roles in defining occupational exposures. Exposure normally occurs by one of three pathways: (i) immersion (direct contact with a liquid or solid chemical substance); (ii) deposition of aerosol or uptake of vapour through the skin; or (iii) surface contact (residue transfer from contaminated surfaces). Sampling methods fall into three categories: surrogate skin; chemical removal; and fluorescent tracers. Surface sampling represents a supplementary approach, providing an estimate of dermal exposure potential. *Surrogate skin techniques* involve placing a chemical collection medium on the skin. Whole-body garment samplers do not require assumptions relating to distribution, an inherent limitation of patch sampling. The validity of these techniques rests on the ability of the sampling medium to capture and retain chemicals in a manner similar to skin. *Removal techniques* include skin washing and wiping, but these measure only what can be removed from the skin, not exposure: laboratory removal efficiency studies are required for proper interpretation of data. *Fluorescent tracer techniques* exploit the visual properties of fluorescent compounds, and

https://deohs.washington.edu/

..... Sett i lys av utviklingen av yrkeshygieniske grenseverdier siste 20-25 årene er det realistisk å se for seg tilsvarende utvikling av grenseverdier for hudeksponering.

R. Fenske, 1993.

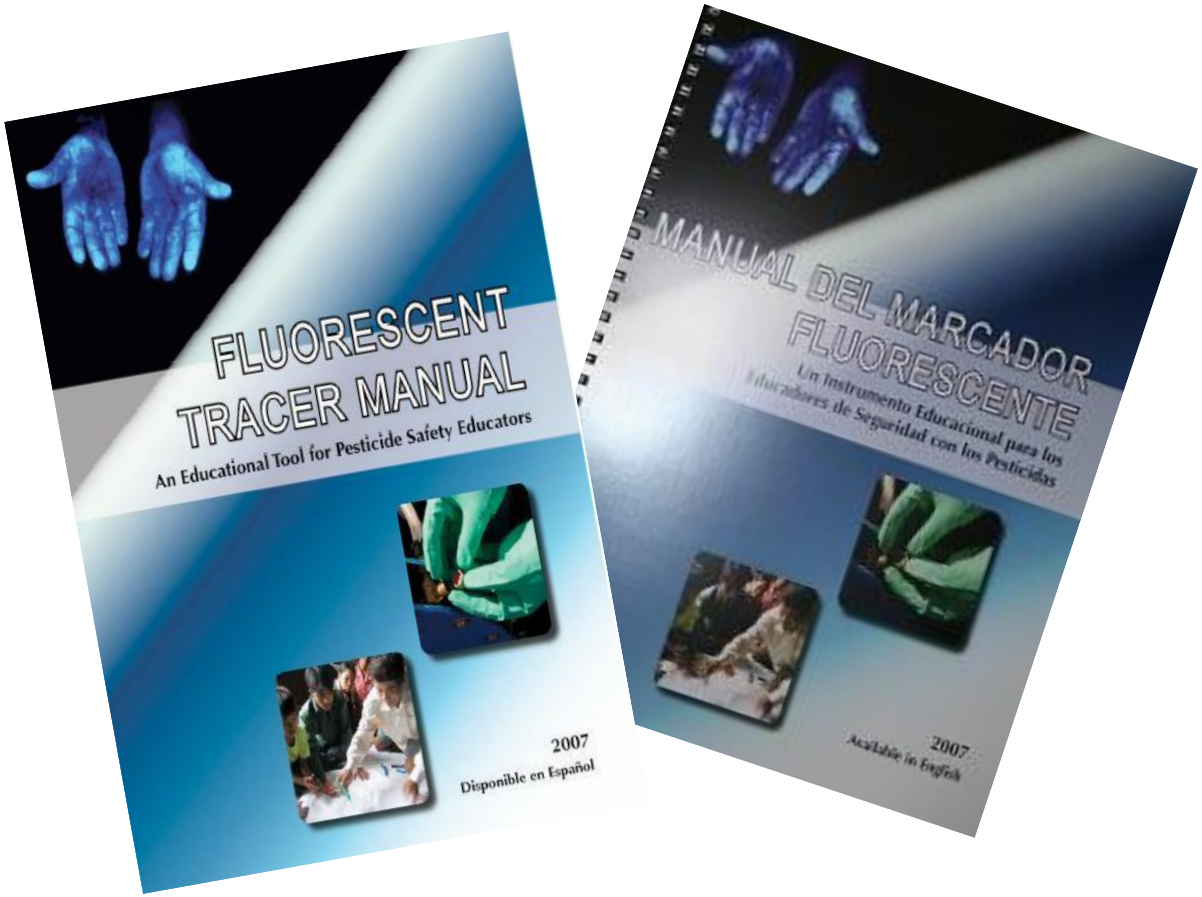
Visualisering av hudeksponering

- Foto

- Indikatormetoder
  - «Lapper» og «kluter»

- Fluorescens

FLUORESCENT TRACER (FT) MANUAL



https://deohs.washington.edu/pnash/fluorescent_tracer

Innhold i FT Manualen

- HMS
- Praktiske råd og hint
- Demonstrasjoner
- Praktisk bruk på arbeidsplassen

Fluorescens i hverdagen

- UVA (svart lys)
- Er «usynlig»
- FT tilsetning i vaskemiddel (hvit tøy), hvitfarge etc.
- Diskotek

FT i bruk innen yrkeshygiene

- Visualisering av hudeksponering
  - Hender
  - Helkropp

- Kvantifisering av hudeksponering
  - Semi-kvantitativt
  - Kvantitativt

- Forskning

Forslag til demonstrasjoner (fra manualen)

1. Baseball cap
2. Unplugging spray nozzle
3. Dirty Fruits and Vegetables
4. Handshake
5. Improper removal of PPE
6. Cellphone, radio, pen, cigarette
7. Pesticide formulations
8. Tyvek™ suit

DEMO#7
Pesticide Formulations

Adapted from Virginia Tech
Pesticide Program
"Hands-on Manual Lesson Plans"

MESSAGE
Different pesticide formulations can lead to different contamination patterns

WHAT YOU NEED
- ☐ Recipe C
- ☐ Recipe D
- ☐ Black light
- ☐ Extension cord or batteries as needed
- ☐ 1 large gallon-size sealable plastic bag or brown grocery paper bag
- ☐ 1 empty bottle
- ☐ 2 backpack sprayers or large jars with lid

Recipe D

¼ teaspoon Tinopal® CBS-X
2¼ cups water

Mix ingredients into 32 oz. spray bottle
Label spray bottle "Recipe D"

Recipe C

2 tablespoon DayClo® Invisible Blue A594-5
2 cups of cornstarch or flour

- Mix ingredients into sealable plastic bag (1 gallon) bag or brown grocery paper bag

PREPARE
- ☐ Use Recipe C to make a simulated dry pesticide and put into a bag.
- ☐ Use Recipe D to make a simulated liquid pesticide and put into a bottle.
- ☐ Practice ahead of time.

PROCEDURE
(1) Ask for two volunteers:
- Volunteer 1 will pour simulated dry pesticide into a spray tank.
- Volunteer 2 will add simulated liquid pesticide into another spray tank.

(2) Shine black light on participants' hands, face, clothing, and work area.
(3) Discuss with participants:
- ➔ *How can the difference in pesticide formulations lead to differences in skin contamination?*

Demo 7 15

DEMO#5
Improper Removal of PPE

PNASH

MESSAGE
"Clean to Clean; Dirty to Dirty"

WHAT YOU NEED
- ☐ Recipe A
- ☐ Black light
- ☐ Extension cord or batteries as needed
- ☐ 1 chemical-resistant jacket and pant suit
- ☐ 1 pair rubber boots
- ☐ Half or full-face respirator
- ☐ 1 pair of chemical-resistant goggles
- ☐ 1 pair of 15-mil nitrile green gloves
- ☐ Black or navy blue hooded sweatshirt

cipe A

teaspoon Tinopal® CBS-X
cups water
cups rubbing alcohol
(70% isopropanol)

Mix ingredients into 32 oz. spray bottle
Label spray bottle "Recipe A"

PARE
ress volunteer in sweatshirt and full-gear PPE.
pray a large amount of tracer mixture on PPE suit, gloves, and back of hood.
ractice ahead of time.

CEDURE
sk the volunteer wearing the full-gear PPE suit to demonstrate removing PPE improperly.
articipants can suggest other improper ways they have seen at their farms.
sk volunteer to:
Remove raincoat hood with contaminated gloves on and touch head and sweatshirt hood
Adjust respirator strap with contaminated gloves on
Unsnap raincoat jacket with contaminated gloves on, and touch sweatshirt underneath
Carry contaminated PPE jacket over bare arm.
hine black light on the volunteer's skin and clothes.
iscuss:
- Think **"Clean to Clean; Dirty to Dirty"** to remember that clean gloves should only touch clean areas and dirty gloves should only touch dirty areas on the outside of PPE.

DEMO#8
Tyvek Suit

WSDA, PNASH

MESSAGE
inated Tyvek™ suits when handling
ot all Tyvek™ suits are laminated.

WHAT YOU NEED
- ☐ Recipe D
- ☐ Black light
- ☐ Extension cord or batteries as needed
- ☐ 1 unlaminated Tyvek™ suit
- ☐ 1 laminated Tyvek™ suit

CBS-X

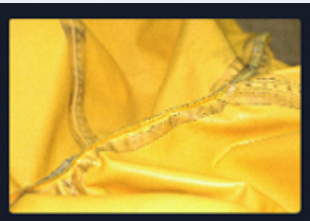
32 oz. spray bottle
Recipe D"

spray bottle.
ime.

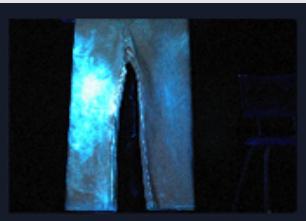
oth Tyvek™ suits.
t.
ted unlaminated Tyvek™ suit to half of the participants.

(4) Pass the contaminated laminated Tyvek™ suit to the other half of the participants.
(5) Shine black light on participants' hands.
(6) Discuss:
- ➔ *How did the unlaminated Tyvek™ suit contaminate participants' hands?*
- ➔ *Why is it important to know whether your Tyvek™ suit is laminated?*
- ➔ *How can you know which Tyvek™ suit is laminated?*

Workplace Applications



PPE Jacket Seam
Costura de Chaqueta de EPP



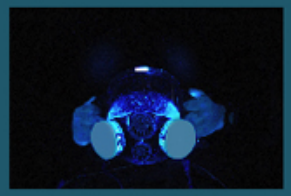
PPE Pants
Pantalón de EPP

Fluorescent Tracer Demonstration

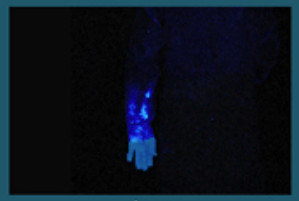
Demonstracion del Marcador Fluorescente

How did this happen? Como ocurrio?

Sweatshirt Hood
Capucha de Sudadera

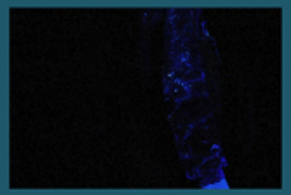


Respirator
Respirador

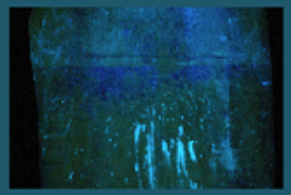


Arm
Brazo

Sweatshirt Neck
Cuello de Sudadera



Arm
Brazo



PPE Apron
Delantal de EPP

Face
Cara

Sweatshirt
Sudadera

Mulig anvendelse på arbeidsplass

- Blande FT inn i tank
- Visualisering av eksponering knyttet til miksing, fylling, påføring og mekanisk arbeid
- Bevisstgjøring (simulering, trening)
- Dokumentasjon (foto)

Observasjon (fra manualen)

Routine activities:

- ☐ Mixing
- ☐ Loading
- ☐ Applying
- ☐ Removing and decontaminating PPE

Non-routine activities in the field:

- ☐ Adjusting, repairing, maintaining application equipment
- ☐ Taking breaks for water or the bathroom
- ☐ Removing and adjusting PPE
- ☐ Eating
- ☐ Rubbing face and eyes
- ☐ Using cell phones and radios

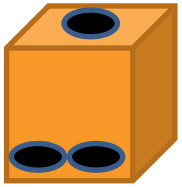
Environmental conditions:

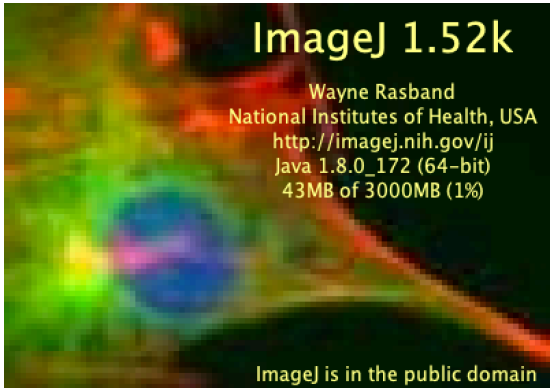
- ☐ Wind speed
- ☐ Wind direction
- ☐ Temperature

Other observations:
Activities and conditions specific to your farm or orchard.

Observations:

«Semi»–kvantitativ bruk





Farge - > grå toner (8-bit)

Andel hud (H=50%)

Andel flourescens (E=0,74%)

Eksponert hud = E/H = 1,5%

Utstyr

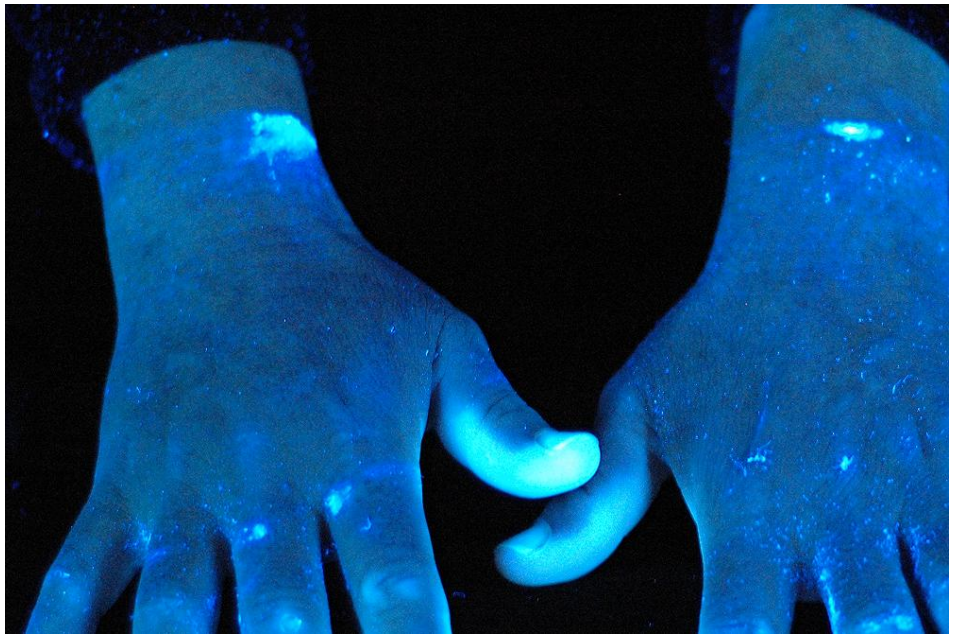
- «Svart boks» (laget av min far)
- ImageJ (gratis)

- Kjøpt:
  - FT (UV hvit farge)
  - UVA lampe (seddellampe)
  - Hansker
  - Rengjøringsmiddel (isopropanol)

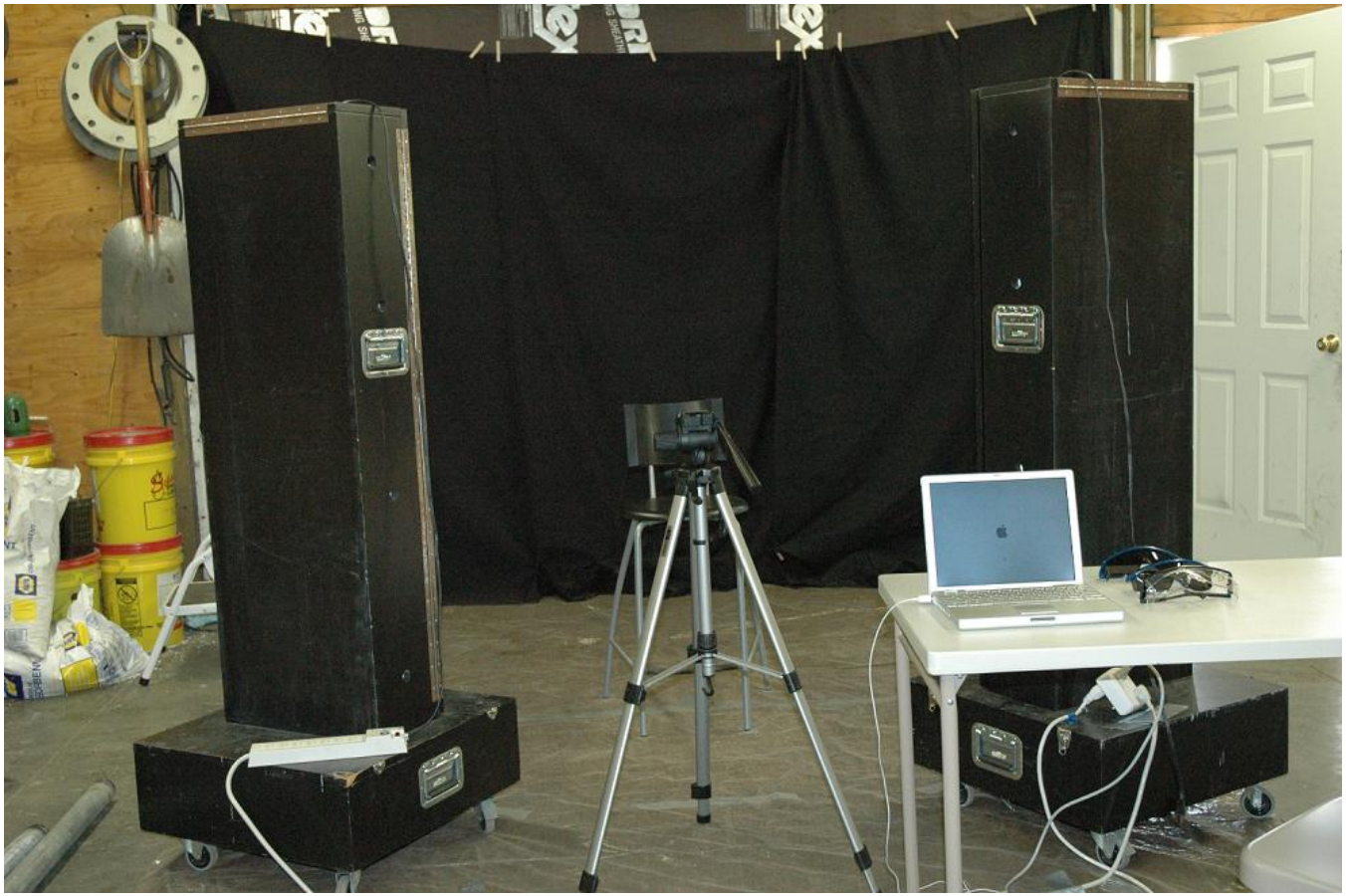
Samlet kostnad < 1000 kr

Eksponering eller ikke?

- Sminke
- Solkrem
- Lo
- Vaksemiddel / såpe
- Hvite klær
- Flass / tørr hud
- Annen eksponering (flourescerende kjemikalier)



UTSTYR FOR HELPROPPSVISUALISERING



(mobilt «diskolys» anlegg)

Lav kostnad. Mulig å benytte i bistandsprosjekter.

Manuell sprøyting. Srer Khmer NGO, Cambodia/PNASH

Hvordan bytte handsker på en sikker måte

Proactima´s kjemikaliesenter

Spesialisert og fleksibel.

Leveranse:

- Mottak av kjemikaliesøknader
- Kvalitetssikre kjemikalieinformasjon
- Risikovurdering (helse og arbeidsmiljø, sikkerhet og ytremiljø)
- Oppdatering og vedlikehold av stoffkartotek
- Tilbakemelding til rekvirent og innkjøp
- Myndighetsrapportering

Respons / servicenivå:

- Mulighet for utvidet vakt (7-23, helg, 24/7)

Vi tilbyr:

- Høy kompetanse (sertifisert yrkeshygienikere)
- Lang erfaring med kjemikalieadministrasjon for ulike selskaper
- Effektiv administrasjon ved bruk av PCMS (Proactima Chemical Management System) og ChemiRisk
- Tilgang på tverrfaglig kompetanse (helse og arbeidsmiljø, sikkerhet og ytremiljø)

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SPØRSMÅL ?

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