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**Document Date: 30/06/13**
**Document Type: Impact Report**
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# Weed Control Trainings for Agricultural Stakeholders is Increasing Wheat Productivity in Northern Afghanistan

**Key words:** extension; wheat agronomy; weed control; Afghanistan

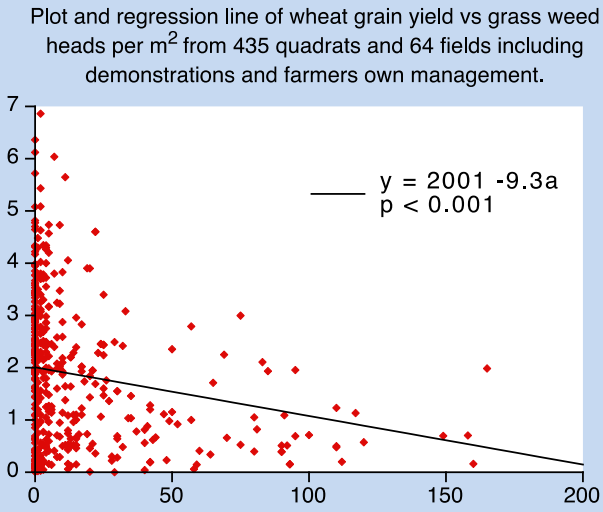
## Summary

Weeds are reducing wheat production by more than 30% in Northern Afghanistan, and hindering any attempt at increasing yields. However, proper use of herbicides can have a rapid and major positive impact. JDA has seen that farmers respond very favorably to small group training over 1.5 days, focused on proper use of available herbicide and supported by offering back pack sprayers and personal protective equipment. JDA has done integrated weed control training with ag retailers, extension workers, faculty at two universities and farmers, and is finding that consistent messaging across various stakeholders has good results.

Extensive weed impact surveys involving more than 400 quadrates of wheat yield samples and a survey of 9 training group leaders and 29 farmers, suggest that 170 groups of 12 farmers each have increased wheat production by 790 t during 2012 and 2013; an improvement valued at 225,850 USD in today's prices. Anecdotally, JDA regularly hears of farmers training other farmers, and farmers demanding specific herbicides or equipment and better advice from ag retailers, sometimes using JDA brochures as guide. While hands-on training and appropriate herbicide use has a dramatic impact, improved weed control goes beyond spraying. More effort is needed to develop the skills of agricultural stakeholders in integrated approaches and solutions to specialized problems. But targeted training is important and cost-effective in addressing the weed problem in wheat. JDA expects the impact of continued trainings to increase year over year. See course outline in appendix 1.

## Introduction

**Figure 1: wheat response under weed pressure.**




In a 2011 impact survey, JDA found that the weed infestation had been understated, but that simple improvements in management could have a huge benefit. A crude estimate for wheat yield losses in Northern Afghanistan is 30%, but much worse in some places where weed infestation is so dense that it makes the intended crop hard to identify. The survey showed an average of 20 grass weeds per m2 which accounted for lost yield of 180 kg / ha (see Figure 1). But JDA found that a single timely spray of either a broadleaf or grass weed type herbicide, available locally, could cut losses by 30%.

Weed control methods implemented over time have cumulative beneficial effects as the weed burden in the soil seed bank can be reduced. An integrated approaches are preferable, reducing reliance on the market as well as the human and agro-ecological risks associated with herbicides.

**Figure 2: Weed burden in a typical wheat field. (It is hard to find the wheat.)**

Farmers employ a range of techniques for reducing weed competition including; late sowing, high seed rates, and hand weeding. Herbicides have been used in recent years, but retailers, extension actors, and farmers have limited understanding of what product should be used or how to use it effectively. One common mistake is to spray very late in the season, but it is also not unusual for a retailer to sell the completely wrong herbicide.

Land tenure is an additional challenge to improving weed management since the burden of responsibility lies with the tenant, but the benefits are reaped by the land owner. Nevertheless, JDA has seen that farmers are highly receptive to weed control training, probably because they have not realized how simply and inexpensively weeds can be controlled.

Here we briefly present some of JDA's training with farmers, extension services, ag input dealers and universities in integrated weed control, but concentrate on basic farmer trainings around herbicide use and its impact.

## Activities

JDA delivered a basic weed control training during IDEA NEW projects from 2009-2013 to more than 8,118 farmers:

2009/10 4 provinces, 19 districts, 1702 farmers

2010/11 5 provinces, 29 districts, 3127 farmers

2011/12 5 provinces, 29 districts, 2680 farmers

2012/13 5 provinces, 18 districts, 606 farmers

**Figure 3: JDA trainer delivering specialized weed control training in Saripul, Suzma Qala 2013**

JDA invested in this area in two ways: finding a solution to the un-availability of herbicide nozzles for back pack sprayers, and piloting more intensive specialized integrated trainings for small groups in 2012.

In 29 groups, 350 farmers came to a 3-day participatory session with each group receiving a back pack sprayer. These farmers cultivate 1,050 ha of land each year. The session proved so successful that JDA has incorporated more standalone weed control training into its agronomy program.

In 2012, JDA also accepted a request from members at Balkh University's agriculture department to present an integrated weed control workshop. Seven members attended the course designed to introduce literature and materials that could be utilized in the existing university curriculum, see figure 4. Similar trainings were given to faculty and students at Samangan University.

**Figure 4: field workshop with 7 Balkh University Faculty of agriculture teachers.**

2013

In 2013 these trainings were main streamlined and incorporated into our other agronomy courses:

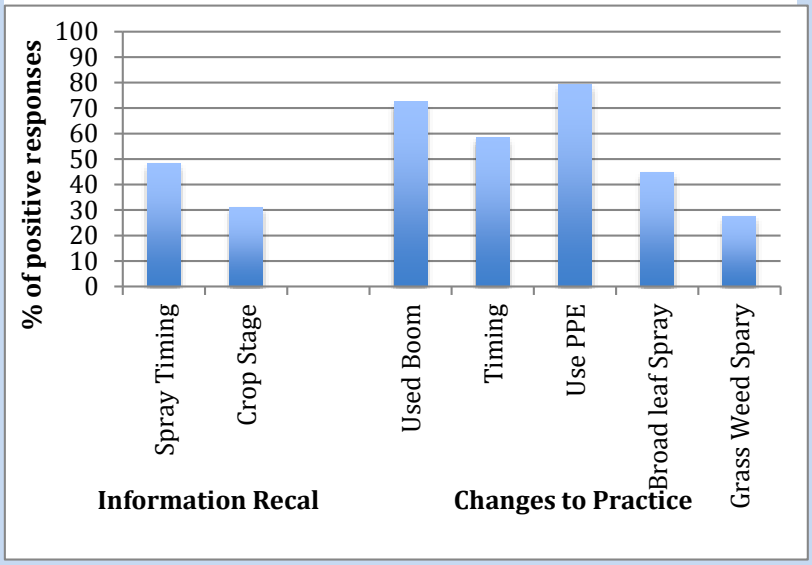
- 62 Weed Control Specialist Trainings: 762 participants
- 79 Weed Control Trainings as part of a wider course: 1,171 participants
- 32 Ag Retailers trained
- 35 Back pack sprayers bought by farmers or ag retailers
- 5 Back pack sprayers donated to 2 universities, and integrated weed control trainings given.

JDA also placed 30 back pack sprayers with five ag retailers to stimulate farmers' interest in improved, specialist equipment, and to monitor the effectiveness of increasing private sector demand.

## Outcomes

In the season following training, JDA conducted a survey of 9 group leaders and 29 farmers on their use of back pack sprayers. Three group leaders from Balkh, Jawzjan and Samangan were selected at random, as well as three individual members of their groups.

**Figure 5: 29 participants were asked about the impact of weed control trainings on their practice; and information recall.**




Group leaders had been trained in sprayer management and monitoring techniques and responsible for checking pump condition and train any non-group member in the application of the pump: they have good knowledge of the pump's use.

*Findings*

Answers from group leaders suggested that 9 in 12 group members used the pump, as well as 6 or 7 non-group farmers. In addition, several farmers shared the training and new knowledge with others in their community. Individual interviews revealed similar findings with 9 or 10 in 12 having used the pump. Leaders' log books and recall suggested that attendees sprayed 0.69 ha each; individual interviews put the figure a little higher, at more than 1 ha per adopter, or 0.8 ha per attendee, (see table 1).

**Table 1: summary of group leaders records regarding pump use. JDA weed control trainings, northern Afghanistan, 2013. 5 jeribs = 1 ha**

| Name/Group Leader | Province | District | Village | Jeribs controlled for Weeds | Jeribs Sprayed for Other Purposes | Total Jeribs Sprayed | #Farmers that have used the Pump |
|---|---|---|---|---|---|---|---|
| Abibullah | Balkh | Dehdadi | Negari | 24 | 13 | 37 | 8 |
| Nabi Jan | Balkh | Sholgara | Qadim | 42 | 4 | 46 | 13 |
| Abdul Satar | Balkh | Balkh | Uf Malik | 21 | 2 | 23 | 7 |
| Mohd. Dawod | Samangan | Hazrat Sultan | Ghaznigak | 50 | 6 | 56 | 17 |
| Fazel | Samangan | Center | Hasan Khil | 40 | 5 | 45 | 15 |
| Haji Qadir | Samangan | Center | Khoja Ismail | 32 | 6 | 38 | 24 |
| Abdul Baseer | Jawz Jan | Center | Qara Kent | 32 | 16 | 48 | 11 |
| Ab Shokor | Jawz Jan | Center | Hassan Abad | 30 | | 30 | 4 |
| Hiatullah | Jawz Jan | Faiz Abad | Sansiz | 100 | 200 | 300 | 40 |
| | | | **Grand Total** | **371** | **252** | **623** | **139** |
| | | **Average Per Group** | | **41** | **28** | **69** | **15** |

We also found that (see figure 5, previous page):

- Every farmer using the new pump, also used the specialist new boom and nozzles
- Every farmer using the sprayer could identify a change that they brought to their weed control approach from last year
- 62 % of farmers interviewed could recall at least one learning point from the training
- More people than we trained used the pump (because of non-group farmers)

JDA estimate that farmers spraying correctly for the first time are increasing their yields by more than 20% which is 114 USD for a typical farmer growing 1 ha of wheat.

*Ag Retailer Follow Up*

One agricultural retailer in each of the 5 northern provinces was invited to buy pumps at a wholesale price. Supply was limited and retailers, recognizing the pump's good quality wanted more than available. On follow up with the Balkh distributor, retailers reported quick sales to farmers who had previous knowledge of the models. This is a unique market correlation and an obvious link to JDA's field trainings; Samangan, Jawzjan, Sare Pul, and Faryab retailers each reported similarly.

*Economic impact of 2013 trainings*

**Table 2: physical and financial impact of 2013 weed control trainings**

| | |
|---|---|
| 1,933 | Farmers Trained |
| 1,450 | ha brought under improved control |
| 400 | kg / ha increased yields |
| 579,900 | kg increased production |
| 286 | USD / t price of wheat |
| 165,851 | USD value of increased production |

## Conclusions

While JDA trainings are given within a framework of integrated weed control, the heart of the impact lies in correct herbicide use, which is an excellent start to addressing weed problems in wheat. However, for resilient and sustainable agricultural production farmers will develop a set of techniques for all their crops not limited to spraying when viable. Even within the context of spraying in wheat, JDA's major success has been narrow, mainly focused on the use of select broadleaf and grass weed type sprays. As knowledge from these trainings extends over the coming years, continue improvements in wheat yields will be dependent on addressing still unanswered challenges, such as ecological aspects, sedge, and annual rye in wheat, will need to be the subject of future adaptive and applied research and investigation.

Participatory trainings in weed control across the value chain, including in educational institutions, is returning excellent value to project expenditure and should be supported over the next few years as the core of any effort to increase production. It is important to note that other techniques for improving crop production, such as reduced seed rates or increased early nitrogen, can worsen weed problems. Hence improved weed control should be a pre-cursor or at least key co-technology in agricultural development.

## APPENDIX 1. Course Content

### Weed Control Training

At minimum, this course should be 1 day training plus a field follow-up visit during spraying. It can be done in 1.5 days, but even better carried out over 2.5 days with the second half day for field visits.

### Training Day- Main components and objectives:

A. Introductory Discussion

The trainer will become familiar with the farming system, the challenge of weeds at the specific location, and the interest and capacity of farmers. This allows the trainer to learn from the participants, for farmers to learn from each other, and for the trainer to establish rapport, and customize the training to the farmers and their environment.

B. Learning Points Check List

JDA has identified some key knowledge and skills that farmers are likely to need. Not all points will be necessary, and understanding from training part A. should be used to prioritize the objectives.

C. Pump Ownership / Management / Handover

Lack of access to a pump can be a problem and booms are not available at all. JDA has found that groups are willing share a pump, even with outsiders, but discussion of roles and responsibilities is helpful for successful group ownership. This section should increase the usage and life of the pump. A user log also helps with follow up surveys.

## A: Weed Control Introductory Discussion

1) What impact on yields do farmers think weeds have in their fields?
2) Do the group members control weeds? If yes, how? If no, why? Do weed have any particular value?
3) What do they know about the weeds, can they name types? Broad or grass leaved types? Are they experienced with spraying weeds? Discuss types that can be controlled, available herbicides, and times of spraying?
4) What is the most common type of weed in your area?

## B: Training Main Content Check list

1) Herbicide Application Safety – hazards, health, storage of chemicals, disposal.
2) Negative impact of weeds e.g. decreases yield maybe 30 %; N and seed rate relationship.
3) Weed population increase over time – self seeding, ploughing in.
4) If weed controlled at right time then more easily killed, and before damage to wheat.
5) Application timing specifics: weed and wheat stages; danger periods i.e. heat, frost, wind.
6) Herbicide Selection – give brochure and describe how to use.
7) Sprayer: Type of Nozzles; Multiple Nozzles booms how to get good coverage; Sprayer Assembly; Pressure regulation; Speed; Nozzle Height from soil surface
8) Showing of Weed posters ( Safety, Herbicide side effects)
9) Herbicide Rates of available herbicides.

## C: Pump Handover

1) Introduce and ask for agreement of interests to receive a the pump
2) The group must agree on each of the following (give time for discussion): a. Where they want to keep the pump; b. who will be allowed to use it i.e. non group farmers; c. Terms of use i.e. payment or lend and different for non-group farmers; d. Maintenance and repairing, who will do it if broken, who will pay.
3) Ask if they want to record the use, no problems if high or low but useful for us: give log book.