
A
B
C
D
E
F
0
1
2
3
4
5
6

1
00:00:05,430 --> 00:00:03,510
the dragon cargo ship that is launching

2
00:00:07,510 --> 00:00:05,440
today is carrying a variety of supplies

3
00:00:09,589 --> 00:00:07,520
for the station and its crew members

4
00:00:11,430 --> 00:00:09,599
including several new experiments some

5
00:00:14,789 --> 00:00:11,440
of which are designed to learn more

6
00:00:17,150 --> 00:00:14,799
about how plants grow in weightlessness

7
00:00:18,790 --> 00:00:17,160
one of them is known by the acronym cara

8
00:00:21,429 --> 00:00:18,800
c-a-r-a

9
00:00:23,830 --> 00:00:21,439
and uh the principal investigator dr

10
00:00:25,029 --> 00:00:23,840
analisa paul of the university of

11
00:00:26,870 --> 00:00:25,039
florida is on the phone with me this

12
00:00:28,550 --> 00:00:26,880
morning to talk about that

13
00:00:30,630 --> 00:00:28,560

so it's an exciting day today because

14
00:00:32,069 --> 00:00:30,640
we've got this uh cargo craft that's

15
00:00:34,470 --> 00:00:32,079
going up and we've got we know we've got

16
00:00:35,910 --> 00:00:34,480
several uh lots of supplies and several

17
00:00:38,150 --> 00:00:35,920
experiments one of those experiments i

18
00:00:39,910 --> 00:00:38,160
wanted to talk to you about is cara we

19
00:00:42,069 --> 00:00:39,920
said this is an acronym can you tell us

20
00:00:43,670 --> 00:00:42,079
what cara stands for and generally what

21
00:00:45,110 --> 00:00:43,680
you are trying to find out in this

22
00:00:47,670 --> 00:00:45,120
investigation

23
00:00:51,029 --> 00:00:47,680
sure so cairo stands for characterizing

24
00:00:51,990 --> 00:00:51,039
arabidopsis root attractions and it is

25
00:00:54,150 --> 00:00:52,000
um

26
00:00:56,389 --> 00:00:54,160
flying a type of plant called

27
00:00:58,630 --> 00:00:56,399
arabidopsis phthaliana which is

28
00:01:00,549 --> 00:00:58,640
essentially a you know it's a model

29
00:01:02,709 --> 00:01:00,559
organism for plants it's what you might

30
00:01:05,429 --> 00:01:02,719
think of as the white mouse of the plant

31
00:01:07,910 --> 00:01:05,439
world and it is utilized in a lot of

32
00:01:09,270 --> 00:01:07,920
different ground studies as well as

33
00:01:11,030 --> 00:01:09,280
we've run a number of different space

34
00:01:13,030 --> 00:01:11,040
flight experiments with arabidopsis in

35
00:01:15,749 --> 00:01:13,040
the past what we're trying to find out

36
00:01:19,190 --> 00:01:15,759
with this particular experiment is some

37
00:01:21,270 --> 00:01:19,200
of the nuances that plants use to sense

38
00:01:23,350 --> 00:01:21,280

their environment as they grow

39
00:01:25,030 --> 00:01:23,360
without the cues that you normally have

40
00:01:27,190 --> 00:01:25,040
in place and so on the ground of course

41
00:01:29,510 --> 00:01:27,200
you've got gravity which

42
00:01:31,590 --> 00:01:29,520
roots growth towards gravity and shoots

43
00:01:34,230 --> 00:01:31,600
the leaf part grows away from gravity

44
00:01:36,710 --> 00:01:34,240
and the other major cue for growing on

45
00:01:37,830 --> 00:01:36,720
the ground is of course light and so

46
00:01:39,990 --> 00:01:37,840
what we're trying to do with this

47
00:01:42,310 --> 00:01:40,000
particular experiment is we are taking

48
00:01:44,710 --> 00:01:42,320
gravity out of the equation and looking

49
00:01:46,630 --> 00:01:44,720
how plants grow on the surface of these

50
00:01:47,749 --> 00:01:46,640
square auger plates

51
00:01:49,830 --> 00:01:47,759
um

52
00:01:51,910 --> 00:01:49,840
when the light source isn't a directed

53
00:01:54,630 --> 00:01:51,920
one as opposed to

54
00:01:57,270 --> 00:01:54,640
coming just from one direction and

55
00:01:59,910 --> 00:01:57,280
seeing how the roots and shoots grow in

56
00:02:01,830 --> 00:01:59,920
that very diffuse lighting environment

57
00:02:04,230 --> 00:02:01,840
of just slapped up against the bulkhead

58
00:02:06,149 --> 00:02:04,240
of the space station with uh with no

59
00:02:07,429 --> 00:02:06,159
gravity also to give them give them

60
00:02:10,150 --> 00:02:07,439
direction

61
00:02:11,990 --> 00:02:10,160
so tell me also we were just looking at

62
00:02:13,830 --> 00:02:12,000
a couple of pictures of these plants

63
00:02:15,670 --> 00:02:13,840

what kind of plants are you flying and

64
00:02:17,430 --> 00:02:15,680
then why did you pick them for this

65
00:02:19,510 --> 00:02:17,440
particular experiment

66
00:02:21,270 --> 00:02:19,520
so so they said these are arabidopsis

67
00:02:22,790 --> 00:02:21,280
phthaliana that's the genus and the

68
00:02:25,910 --> 00:02:22,800
species of these plants we usually just

69
00:02:27,830 --> 00:02:25,920
call them arabidopsis for short the um

70
00:02:30,309 --> 00:02:27,840
we chose those because as they said they

71
00:02:32,949 --> 00:02:30,319
are the model organism for plants they

72
00:02:35,110 --> 00:02:32,959
we know um everything about their genome

73
00:02:38,470 --> 00:02:35,120
it's been completely sequenced it's very

74
00:02:40,309 --> 00:02:38,480
well characterized on the the uh

75
00:02:42,229 --> 00:02:40,319
in ground experiments it's been used for

76
00:02:44,229 --> 00:02:42,239
just decades and decades in plant

77
00:02:45,589 --> 00:02:44,239
physiology plant molecular biology

78
00:02:48,070 --> 00:02:45,599
research

79
00:02:50,390 --> 00:02:48,080
in addition rob ferl and i my colleague

80
00:02:51,990 --> 00:02:50,400
in the in this business have done a

81
00:02:54,710 --> 00:02:52,000
number of different space flight

82
00:02:57,190 --> 00:02:54,720
experiments with this same plant and so

83
00:02:59,589 --> 00:02:57,200
every time we do an experiment we get

84
00:03:02,070 --> 00:02:59,599
answers and those answers then develop

85
00:03:03,830 --> 00:03:02,080
into new hypotheses and new questions

86
00:03:05,589 --> 00:03:03,840
and so the experiment that we're we're

87
00:03:07,910 --> 00:03:05,599
launching today with these plants is

88
00:03:09,830 --> 00:03:07,920

actually based on information that we

89
00:03:11,990 --> 00:03:09,840
got from the previous space flight

90
00:03:14,390 --> 00:03:12,000
experiment with these same type of type

91
00:03:16,070 --> 00:03:14,400
of plants tell me how will the station

92
00:03:17,750 --> 00:03:16,080
crew members be actually participating

93
00:03:19,750 --> 00:03:17,760
in the in the experiment what will they

94
00:03:23,110 --> 00:03:19,760
be doing with the plants

95
00:03:24,550 --> 00:03:23,120
well in two ways um one is that we

96
00:03:27,430 --> 00:03:24,560
part of what we would like to do is

97
00:03:29,589 --> 00:03:27,440
we're looking at the

98
00:03:31,990 --> 00:03:29,599
molecular biology of these plants and so

99
00:03:33,990 --> 00:03:32,000
not just how the roots grow but what

100
00:03:36,229 --> 00:03:34,000
governs the way they grow

101
00:03:37,830 --> 00:03:36,239
and part of the mechanism to do this is

102
00:03:39,509 --> 00:03:37,840
we've engineered these plants with

103
00:03:40,550 --> 00:03:39,519
something called the green fluorescent

104
00:03:43,350 --> 00:03:40,560
protein

105
00:03:46,070 --> 00:03:43,360
reporter gene that is

106
00:03:48,309 --> 00:03:46,080
essentially reports back to where

107
00:03:51,509 --> 00:03:48,319
certain genes are being engaged as the

108
00:03:53,270 --> 00:03:51,519
plant grows and develops it glows green

109
00:03:55,750 --> 00:03:53,280
but you have to have a special mechanism

110
00:03:57,990 --> 00:03:55,760
to see the fluorescence you can't just

111
00:04:00,309 --> 00:03:58,000
see it in regular light and so one of

112
00:04:02,630 --> 00:04:00,319
the things that we can do is use a

113
00:04:04,869 --> 00:04:02,640

device called the lmm for light

114
00:04:06,309 --> 00:04:04,879
microscopy module that's on station it's

115
00:04:08,070 --> 00:04:06,319
essentially a

116
00:04:10,470 --> 00:04:08,080
very sophisticated fluorescent

117
00:04:13,030 --> 00:04:10,480
microscope that is run

118
00:04:14,710 --> 00:04:13,040
by a glenn research center and so what

119
00:04:16,629 --> 00:04:14,720
the astronaut will do is they'll take

120
00:04:18,069 --> 00:04:16,639
one of the plates and there's there's

121
00:04:19,590 --> 00:04:18,079
there's a number of plates that are

122
00:04:21,590 --> 00:04:19,600
being flown but they'll take one of the

123
00:04:23,990 --> 00:04:21,600
specific plates that has been has some

124
00:04:26,629 --> 00:04:24,000
of these engineered plants on it and put

125
00:04:29,189 --> 00:04:26,639
it on the light microscopy module

126
00:04:30,870 --> 00:04:29,199
apparatus and then what we will do is

127
00:04:32,070 --> 00:04:30,880
we'll be traveling to glen research

128
00:04:35,110 --> 00:04:32,080
center to

129
00:04:37,909 --> 00:04:35,120
then use the microscope

130
00:04:40,550 --> 00:04:37,919
up there to manipulate what's on station

131
00:04:43,110 --> 00:04:40,560
and so the astronaut will put the plate

132
00:04:45,510 --> 00:04:43,120
on the microscope but then it will be

133
00:04:47,350 --> 00:04:45,520
managed by some of the engineers and

134
00:04:50,790 --> 00:04:47,360
scientists at glenn research center as

135
00:04:52,629 --> 00:04:50,800
we see what is glowing on orbit

136
00:04:54,469 --> 00:04:52,639
thank you so much for talking with me